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THE CALENDAR FOR 1931–32

First Term

		1931	
Sept.	21	Monday	University entrance examinations begin.
Sept.	28	Monday	Academic year begins. Registration of new students.
Sept.	29	Tuesday	
		9–12 a. m.	Registration of new students.
		1–5 p. m.	Registration of old students.
Sept.	30	Wednesday	Registration of old students.
Oct.	1	Thurs. 8 a. m.	Instruction begins.
Oct.	23	Friday	Last day for payment of tuition.
Nov.	4	Wednesday	Registration of winter-course students.
Nov.	26–28		Thanksgiving recess.
Dec.	19	Sat. 12.50 p.m.	Instruction ends in regular and winter courses. (Christmas recess.)
		1932	
Jan.	4	Mon. 8 a.m.	Instruction resumed in regular and winter courses. (Christmas recess.)
Jan.	11	Monday	Birthday of Ezra Cornell. Founder's Day.
Feb.	1	Monday	Term examinations begin.

Second Term

Feb.	12	Friday	Instruction ends in winter courses.
Feb.	12	Friday	Registration of all students.
Feb.	13	Saturday	
Feb.	15	Mon. 8 a.m.	Instruction begins in regular courses.
Feb.	15–20		Farm and Home Week.
Mar.	7	Monday	Last day for payment of second-term tuition.
Apr.	2	Sat. 12.50 p.m.	Instruction ends. (Spring recess.)
Apr.	11	Mon. 8 a.m.	Instruction resumed. (Spring recess.)
May	28	Saturday	Spring Day, recess.
June	6	Monday	Term examinations begin.
June	20	Monday	Sixty-fourth Annual Commencement.

NEW YORK STATE COLLEGE OF AGRICULTURE

STAFF OF INSTRUCTION, RESEARCH, AND EXTENSION

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Anson Wright Gibson, M.S., Associate Secretary, Former Student Relations.
Willard Waldo Ellis, A.B., LL.B., Librarian.
George Wilson Parker, Bursar.

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Donald Reddick, Ph.D., Professor of Plant Pathology and Plant Pathologist in the Experiment Station.
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Martha Van Rensselaer, A.B., D.Ped., Professor of Home Economics.
James Adrian Bizzell, Ph.D., Professor of Soil Technology and Soil Technologist in the Experiment Station.
Glenn Washington Herrick, B.S.A., Professor of Economic Entomology and Entomologist in the Experiment Station.
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Harold Ellis Ross, M.S.A., Professor of Dairy Industry.
Hugh Charles Troy, B.S.A., Professor of Dairy Industry and Dairy Chemist in the Experiment Station.
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Karl McKay Wiegand, Ph.D., Professor of Botany.
Arthur Bernard Recknagel, B.A., M.F., Professor of Forest Management and Utilization.
Merritt Wesley Harper, M.S., Professor of Animal Husbandry and Animal Husbandman in the Experiment Station.
Cyrus Richard Crosby, A.B., Extension Professor of Entomology.
Elmer Seth Savage, Ph.D., Professor of Animal Husbandry and Animal Nutritionist in the Experiment Station.

*On leave first term. ‡On leave first and second terms.

Edward Albert White, B.Sc., Professor of Floriculture and Ornamental Horticulture and Floriculturist in the Experiment Station.
Herbert Andrew Hopper, B.S.A., M.S., Extension Professor of Animal Husbandry.
Edward Sewall Guthrie, Ph.D., Professor of Dairy Industry and Dairy Technologist in the Experiment Station.
William Charles Baker, B.S.A., Professor of Drawing.
Mortier Franklin Barrus, Ph.D., Extension Professor of Plant Pathology.
Oskar Augustus Johannsen, Ph.D., Professor of Entomology and Entomologist in the Experiment Station.
Clyde Hadley Myers, Ph.D., Professor of Plant Breeding and Plant Breeder in the Experiment Station.
Bristow Adams, B.A., Professor in Extension Service, Editor, and Chief of Publications.
Asa Carlton King, B.S.A., Professor of Farm Practice and Farm Superintendence.
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Lewis Knudson, Ph.D., Professor of Botany and Plant Physiologist in the Experiment Station.
Ralph Wright Curtis, M.S.A., Professor of Ornamental Horticulture.
Harry Oliver Buckman, Ph.D., Professor of Soil Technology.
Ralph Hicks Wheeler, B.S., Professor in Extension Service, Acting Director of Extension (first term).
Paul Work, Ph.D., Professor of Vegetable Crops and Investigator in Vegetable Crops in the Experiment Station.
John Bentley, jr., B.S., M.F., Professor of Forest Engineering.
Paul J. Kruse, Ph.D., Professor of Rural Education.
Rolland Maclaren Stewart, Ph.D., Professor of Rural Education.
James Ernest Boyle, Ph.D., Professor of Rural Economy.
Ezra Dwight Sanderson, Ph.D., Professor of Rural Social Organization and Rural Sociologist in the Experiment Station.
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William Joseph Wright, M.S., Professor in Extension Service and State Leader of Junior Extension.
Cora Ella Binzel, Professor of Rural Education.
Byron Burnett Robb, M.S. in Agr., Professor of Agricultural Engineering.
James Kenneth Wilson, Ph.D., Professor of Soil Technology and Soil Bacteriologist in the Experiment Station.
Edmund Louis Worthen, M.S.A., Extension Professor of Soil Technology.
Julian Edward Butterworth, Ph.D., Professor of Rural Education.
James Chester Bradley, Ph.D., Professor of Entomology and Curator of Invertebrate Zoology and Entomologist and Curator in the Experiment Station.
George Charles Embody, Ph.D., Professor of Aquiculture and Aquiculturist in the Experiment Station.‡
Arthur Johnson Eames, Ph.D., Professor of Botany.
John Hall Barron, B.S.A., Extension Professor of Field Crops.
Gad Parker Scoville, B.S. in Agr., M.A., Professor of Farm Management and Investigator in Farm Management in the Experiment Station.
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Montgomery Robinson, Litt.B., B.S., Professor in Extension Service.*
Arthur John Heinicke, Ph.D., Professor of Pomology and Pomologist in the Experiment Station.
Edward Gardner Misner, Ph.D., Professor of Farm Management and Investigator in Farm Management in the Experiment Station.
William Irving Myers, Ph.D., Professor of Farm Finance and Agricultural Economist in the Experiment Station.
Theodore Hildreth Eaton, Ph.D., Professor of Rural Education.
Doak Bain Carrick, Ph.D., Professor of Pomology and Pomologist in the Experiment Station.
Lester Whyland Sharp, Ph.D., D.Sc., Professor of Botany and Cytologist in the Experiment Station.†

*On leave first term. †On leave second term. ‡On leave first and second terms.

Joseph Oskamp, B.S. in Agr., Extension Professor of Pomology.
Harry Morton Fitzpatrick, Ph.D., Professor of Plant Pathology and Mycologist in the Experiment Station.
Otis Freeman Curtis, Ph.D., Professor of Botany and Plant Physiologist in the Experiment Station.
Louis Melville Massey, Ph.D., Professor of Plant Pathology and Plant Pathologist in the Experiment Station.
Axel Ferdinand Gustafson, Ph.D., Extension Professor of Soil Technology.
E. Laurence Palmer, Ph.D., Professor of Rural Education.
Philip Henry Wessels, M.S., Research Professor of Vegetable Crops and Investigator in Vegetable Crops in the Experiment Station.
Frank Ashmore Pearson, Ph.D., Professor of Prices and Statistics and Statistician in the Experiment Station.
Robert Matheson, Ph.D., Professor of Economic Entomology and Entomologist and Parasitologist in the Experiment Station.
John Clarence McCurdy, B.S., C.E., Professor of Agricultural Engineering.
Gustave Frederick Heuser, Ph.D., Professor of Poultry Husbandry and Poultry Husbandman (Nutrition) in the Experiment Station.
Laurence Howland MacDaniels, Ph.D., Professor of Pomology and Pomologist in the Experiment Station.
Gilbert Warren Peck, M.S.A., Extension Professor of Pomology.
Emery N. Ferriss, Ph.D., Professor of Rural Education.
Ralph Almon Felton, Ph.B., M.A., Extension Professor of Rural Social Organization.
James Morgan Sherman, Ph.D., Professor of Dairy Industry and Bacteriologist in the Experiment Station.
Frank Pores Bussell, Ph.D., Professor of Plant Breeding.
Richard Alan Mordoff, Ph.D., Professor of Meteorology.
Everett Franklin Phillips, Ph.D., D.Sc., Professor of Apiculture and Apiculturist in the Experiment Station.†
Paul Francis Sharp, Ph.D., Professor of Dairy Chemistry and Chemist in the Experiment Station.
Arthur Augustus Allen, Ph.D., Professor of Ornithology and Ornithologist in the Experiment Station.
Alpheus Mansfield Goodman, B.S.A., Extension Professor of Agricultural Engineering.
Albert Hazen Wright, Ph.D., Professor of Zoology.
Loren Clifford Petry, Ph.D., Professor of Botany.
Clyde B. Moore, Ph.D., Professor of Rural Education.
Harold Eugene Botsford, B.S., Extension Professor of Poultry Husbandry.
Peter Walter Claassen, Ph.D., Professor of Biology and Entomologist and Biologist in the Experiment Station.
Leland Spencer, Ph.D., Professor of Marketing and Investigator in Marketing in the Experiment Station.†
Earle Volcart Hardenburg, Ph.D., Professor of Vegetable Crops and Investigator in Vegetable Crops in the Experiment Station.
Otto Rahn, Ph.D., Professor of Bacteriology and Bacteriologist in the Experiment Station.
Charles Chupp, Ph.D., Extension Professor of Plant Pathology.
Walter H. Burkholder, Ph.D., Professor of Plant Pathology and Plant Pathologist in the Experiment Station.
Van Breed Hart, Ph.D., Extension Professor of Farm Management.
Frank Harrison Randolph, B.A., M.E., Professor of Institutional Engineering.
Lars-Gunnar Romell, Ph.D., Charles Lathrop Pack Research Professor of Forest Soils and Forest Soil Technologist in the Experiment Station.
Frank Barron Morrison, B.S., Professor of Animal Husbandry and Animal Husbandman in the Experiment Station.
Joseph Pullman Porter, B.S., M.S.A., M.L.D., Acting Professor of Ornamental Horticulture.
Myers Peter Rasmussen, Ph.D., Professor of Marketing and Investigator in Marketing in the Experiment Station.

†On leave second term.

Whiton Powell, Ph.D., Professor of Business Management and Investigator in Business Management in the Experiment Station.
Frank Forrest Hill, Ph.D., Professor of Land Economics and Agricultural Economist in the Experiment Station.
Charles Arthur Taylor, B.S., Professor in Extension Service.
John Huntington Parker, Ph.D., Acting Professor of Plant Breeding.
Lloyd R. Simons, B.S.A., County Agent Leader.
Earl Alvah Flansburgh, B.S., Assistant County Agent Leader.
Lincoln David Kelsey, B.S., Assistant County Agent Leader.
Fred Bishop Morris, B.S., Assistant County Agent Leader.
Forest Milo Blodgett, Ph.D., Assistant Professor of Plant Pathology and Assistant Plant Pathologist in the Experiment Station.
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Roy Glenn Wiggans, Ph.D., Assistant Professor of Plant Breeding and Assistant Plant Breeder in the Experiment Station.
Benjamin Dunbar Wilson, Ph.D., Assistant Professor of Soil Technology and Assistant Soil Chemist in the Experiment Station.
Robert Morrill Adams, B.S., M.A., Extension Assistant Professor of Vegetable Crops.
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William Truman Crandall, M.S., Extension Assistant Professor of Animal Husbandry.
Leland Eugene Weaver, B.S., Extension Assistant Professor of Poultry Husbandry.
Francis Omar Underwood, B.S., Extension Assistant Professor of Vegetable Crops.
Clara Louise Garrett, B.S., Assistant Professor of Drawing.
Walter Conrad Muenscher, Ph.D., Assistant Professor of Botany and Weed Specialist in the Experiment Station.*
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Lincoln Evans Cruikshank, B.S., Acting Extension Assistant Professor of Marketing (second term).
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Howard Francis Bardwell, Instructor in Animal Husbandry and Experimentalist in Animal Husbandry in the Experiment Station.
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Alan Wardlaw Woodrow, B.S., Assistant in Apiculture.
Arthur John Pratt, B.S., Assistant in Vegetable Crops.
George Bradford Saunders, A.B., Assistant in Ornithology.
Daniel Grover Clark, B.S., Assistant in Botany.
Alton Anthony Lindsey, A.B., Assistant in Botany.
Harold Henderson Williams, B.S., Assistant in Animal Husbandry and Assistant in Animal Nutrition in the Experiment Station.
Charles Hughes Crawford, M.S., Assistant in Animal Husbandry and Assistant in Animal Husbandry in the Experiment Station.
Ardron Bayard Lewis, B.S., Assistant in Rural Economy.
Samuel Healea Work, B.S., Assistant in Animal Husbandry and Assistant in Animal Husbandry in the Experiment Station.
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Harold Sanford Perry, A.B., Assistant in Plant Breeding.
Howard Rodgers Waugh, B.S., Assistant in Extension Service.
Mrs. Helen Hill Craig, M.S., Assistant in Botany.
Harriet Creighton, A.B., Assistant in Botany.
Ferdinand Harvey Butt, M.A., Assistant in Limnology.
Eva Lucretia Gordon, B.S., Assistant in Rural Education.
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Robert Bruce McCormack, B.S.A., Research Assistant in Plant Pathology.
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Frank Bradshaw Maughan, B.S., Research Assistant in Entomology.
F. Gray Butcher, M.A., Research Assistant in Entomology.
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Kenneth Hood, B.S., Extension Assistant in Farm Management.
Samuel Edward Ronk, B.S.A., Assistant in Rural Economy.
Lindsay McLeod Black, B.S.A., Assistant in Plant Pathology.

Samuel Ralph Levering, B.S., Assistant in Pomology.
Mary Frances Crowell, A.B., Assistant in Animal Husbandry and Assistant in Animal Nutrition in the Experiment Station.
Louis Linden Madsen, A.B., Assistant in Animal Husbandry and Assistant in Animal Nutrition in the Experiment Station.
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Newell Allen Schappelle, B.S., Assistant in Botany.
Willard Francis Crosier, A.B., Assistant in Botany.
Earl Lee Arnold, B.S., Extension Assistant in Agricultural Engineering.
Lowell Clem Cunningham, M.S., Assistant in Rural Economy.
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Paul Stuart Williamson, B.S., Assistant in Farm Management and Assistant in Farm Management in the Experiment Station.
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Glenn Hedlund, B.S., Assistant in Business Management and Assistant in Business Management in the Experiment Station.
William Walter Reitz, Ph.D., Assistant Soil Surveyor.
Robert Melampy, M.S., Assistant in Animal Husbandry and Assistant in Animal Husbandry in the Experiment Station.
Weston Donehower, B.S., Assistant in Forestry.
Altha Robert Gans, M.S., Assistant in Prices and Statistics.
Alvah Lynn Richey, B.S., Assistant in Forestry.
George Clinton Moore, B.S., Research Assistant in Vegetable Crops and Research Assistant in Vegetable Crops in the Experiment Station.
Louis Carl Maisenhelder, B.S., Assistant in Forestry.
David Gardner Greenleaf, B.S., Assistant Soil Surveyor.
Orlo Harrison Maughan, B.S., Assistant in Farm Management.
Wilber Secor, B.S., Assistant Soil Surveyor.
Merle John Kelly, B.S., Assistant in Meteorology.
Leland Burdine Tate, M.A., Assistant in Rural Social Organization.
Mildred Bertha Thurow, M.A., Assistant in Rural Social Organization.
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Thomas Morton Little, A.B., Research Assistant in Entomology.
Wilford Richard Mills, B.S., Assistant in Botany.
Mrs. Annie Laurie Horsfall, Assistant in Entomology.
Laurence A. Carruth, M.S., Assistant in Biology.
Frank Richard Shaw, B.S., Assistant in Entomology.
Seymour Madison Vaughan, B.S., Assistant in Rural Education.
Earl Young Fitch, M.A., Assistant in Rural Education.
B. Floyd Black, M.A., Assistant in Rural Education.
Melvin Butler Hoffman, M.S., Assistant in Pomology.
Arthur T. Sweet, B.S., Investigator in Pomology.
Robert Snell, M.S., Assistant in Botany.
Edward Marshall Palmquist, B.S., Assistant in Botany.
George Clinton Moore, B.S., Research Assistant in Vegetable Crops.
Herbert Temple Scofield, A.B., Assistant in Botany.
Sarah Creecie Dyal, A.B., Assistant in Botany.
Clifford Charles Wernham, M.A., Assistant in Plant Pathology.

GENERAL INFORMATION

FOUNDATION AND MAINTENANCE

Cornell University is composed of eight colleges and the Graduate School. One of these colleges is the College of Agriculture.

Cornell University was chartered by the Legislature in 1865, being founded on the Land-Grant Act of 1862. By the terms of the Land-Grant Act, teaching in agriculture has been from the first a regular part of the university enterprise. As in other States, the State Government has made large supplementary appropriations for the work in agriculture. In 1904 the Legislature of the State of New York made an appropriation of $250,000 for the erection of buildings for the College of Agriculture in Cornell University, with an additional appropriation for maintenance and operation, and established the College as a state institution under the title, "The New York State College of Agriculture at Cornell University." Before this time the State had established, at Cornell University, the New York State Veterinary College. In 1925 the New York State College of Home Economics at Cornell University, formerly a department of the College of Agriculture, was established as a third state college at Ithaca. In 1906 the Legislature passed an Administration Act, defining the purpose and the activities of the College of Agriculture thus: "The object of the said college of agriculture shall be to improve the agricultural methods of the state; to develop the agricultural resources of the state in the production of crops of all kinds, in the rearing and breeding of livestock, in the manufacture of dairy and other products, in determining better methods of handling and marketing such products, and in other ways; and to increase intelligence and elevate the standards of living in the rural districts. For the attainment of these objects the college is authorized to give instruction in the sciences, arts, and practices relating thereto, in such courses and in such manner as shall best serve the interests of the state; to conduct extension work in disseminating agricultural knowledge throughout the state by means of experiments and demonstrations on farms and gardens, investigations of the economic and social status of agriculture, lectures, publication of bulletins and reports, and in such other ways as may be deemed advisable in the furtherance of the aforesaid objects; to make researches in the physical, chemical, biological, and other problems of agriculture, the application of such investigations to the agriculture of New York, and the publication of the results thereof." Since 1906 the State has provided many additional buildings and has made increasingly large appropriations for maintenance and operation. The College has been designated by the State as the recipient of the funds appropriated to the State by the Federal Government under the Morrill, Capper-Ketcham, and Smith-Lever Acts. It shares with the New York Agricultural Experiment Station at Geneva the funds derived from the Hatch, Adams, and Purnell Acts, and with other institutions those devoted to teacher training under the Smith-Hughes Act.

THE BUILDINGS

The buildings erected under the enactment of 1904 were first occupied in June, 1907. The central group then erected consisted of a main administrative and classroom building, Roberts Hall, connected by covered loggias with the Dairy Building, now East Roberts, on the east, and with Stone Hall, now used by the College Library, on the west. Subsequently, the Legislature provided for the erection of two large barns, a greenhouse range, a forestry building, a poultry-husbandry building, a soils building, an auditorium, a classroom building and a stock-judging building for animal husbandry, several small poultry buildings, a sheep barn, a swine barn, a farm shop and tool shed, and an insectary. There are, in addition, the frame buildings occupied by the Departments of Agricultural Economics and Farm Management and Agricultural Engineering, and a fish-breeding house in Cascadilla Creek, a seed-storage house, a cold-storage and packing house, and other small buildings on the farms. In 1920 the State authorized the College to plan a further development of its building program involving an expenditure of $3,000,000. Under this building plan $500,000 was appropriated in 1920 for a new dairy building, and in 1922 provision was made for its equipment. The building came into use in the fall of 1923. A further appropriation of similar amount was used for completing the Dairy Building, erecting an additional greenhouse range, moving and remodeling the Agricultural Engineering laboratories, and constructing the foundation for the Plant Science Building. The last-named building was completed under an appropriation of $1,100,000 made by the Legislature of 1928, and occupancy began with the second term of 1930–31. The Legislature of 1930 provided $400,000 for the equipment of the Plant Science Building and appropriated $100,000 for additional barns and other smaller buildings for the Department of Animal Husbandry. It also appropriated $100,000 for the construction of the foundation of a building for the Departments of Agricultural Economics and Farm Management and Rural Social Organization, and to this sum the Legislature of 1931 added $500,000 for the completion of the building.

THE FARMS

The College of Agriculture farm includes 1624 acres. It is run not for commercial but for educational purposes, and the practices are therefore modified to meet the varied demands of the institution.

Land in the vicinity of the College is very broken, abounding in hills and dales, brooks and gorges. In consequence, little more than one-half of the total area is now available for tillage. Of the 1624 acres, 924 are classified as arable, 353 as pasture, and 286 as wood and waste, and 56 are devoted to buildings, lots, and gardens.

Part of the tillable area has been assigned to departments as follows: Agronomy, 22 acres; Animal Husbandry, 595 acres; Floriculture and Ornamental Horticulture, 25 acres; Plant Breeding, 67

acres; Pomology, 80 acres; Poultry Husbandry, 72 acres; Vegetable Crops, 9 acres; and there are left to the Office of Farm Practice and Farm Superintendence 295 acres on which to conduct the regular farm operations. Of the other areas, the Department of Animal Husbandry has the use of all the pasture land; the Department of Forestry administers (now for more than a decade) 92 acres of woodland under systematic forest management; and the Department of Entomology uses about 5 acres of waste land for a fish hatchery.

There are a variety of soil types on the college farm. About two-thirds of the tillable area is Dunkirk clay loam. This soil is entirely unsuited to potatoes, and is not well adapted to corn, but will grow fair crops of corn if heavily manured. It is well adapted to wheat, oats, timothy, and clover. The remaining third is Canfield silt loam, Wooster gravelly silt loam, and Volusia gravelly silt loam.

In addition to the lands mentioned, there has recently been conveyed to Cornell University the Matthias H. Arnot Forest of 1850 acres, for the use of the Department of Forestry. It offers exceptional opportunities for instruction and research. Over the greater part of its area the Arnot Forest is made up of second-growth hardwoods and hemlock. It lies mostly in Schuyler County, near the village of Cayuta and within twenty miles of Ithaca.

THE COLLEGE LIBRARIES

The library facilities of the College of Agriculture include: a large collection of books and periodicals on agriculture, animal husbandry, botany, horticulture, forestry, entomology, and other kindred subjects, contained in the University Library and numbering about thirty thousand volumes; the Agricultural College Library in Stone Hall, with a working and reference collection of more than seventy thousand bound volumes and a large number of bulletins, reports, and other pamphlets in unbound form; and various small departmental collections for laboratory and office use. In addition to these, the Agricultural College possesses the Craig horticultural library, gift of the widow of the late Professor John Craig, consisting of about three hundred volumes, and the A. I. Root Memorial Library, recently begun but already containing more than fifteen hundred volumes in the field of apiculture. The Department of Animal Husbandry has a large and rapidly increasing collection of herdbooks, registers, and the like, for the use of its instructing staff and its students. Altogether more than one hundred thousand volumes are available for the instructing staff and the students of the College of Agriculture. Wherever they are housed, the books are regularly catalogued at the University Library.

All these libraries are likewise provided with the principal periodicals relating to agriculture and kindred subjects. In the University Library are to be found the files and current numbers of the leading foreign periodicals, especially those of a purely scientific character and those used chiefly for research. The Agricultural Library carries

on its shelves more than eight hundred periodicals of various kinds for the use of students and faculty; these include the principal agricultural, horticultural, and stock-raising journals of the United States and Canada, together with many from foreign countries. The Entomological Library is supplied with the leading periodicals relating to general and economic entomology. In addition to these, many of the departments receive periodicals for the use of instructors and students, and the Departments of Agricultural Economics and Farm Management, Animal Husbandry, Dairy Industry, Plant Pathology, and Poultry Husbandry maintain small reading rooms of their own.

All the books of the Agricultural College Library are in reserve for reference purposes only; students are allowed to draw them for home use only when the library is closed over night and over Sunday. In order to afford the greatest possible opportunity for using the books, the Agricultural College Library is open from eight in the morning until ten o'clock at night every day of the week during the college year except Saturday, when it is closed at six o'clock in the afternoon.

PAYMENTS TO THE UNIVERSITY

Tuition

Tuition is free to undergraduate students pursuing full, special, or short courses in the New York State College of Agriculture, who at the beginning of the college year are, and for at least twelve months prior thereto have been, bona-fide residents of the State of New York; provided, however, that no student shall be allowed to transfer from any such course to another course wherein tuition is charged without first paying the regular tuition fees for the hours for which he may receive credit in the latter course.

Students in Agriculture who are not exempt under these provisions are required to pay tuition as follows: for the regular year, $200; for the Summer School in Agriculture, $60; for the Winter Courses in Agriculture, $25. Tuition-paying students transferring from the College of Agriculture to other colleges in the University must first make payment for the number of hours with which they are credited upon transfer, at a rate per hour equal to the difference in the rates of tuition in the two colleges.

The tuition fee of $200 is payable in installments of $110 at the beginning of the first term and $90 at the beginning of the second term, but a student registered only for the second term of the academic year is required to pay at the rate of the first term.

Students desiring to take, while registered in the College of Agriculture, courses in other colleges in the University, beyond those specifically required and also beyond the twenty hours allowed free, may do so upon payment of tuition for the additional hours at the rate of tuition in the college in which the work is taken.

Tuition and other fees become due when the student registers. The University allows twenty days of grace after the last registration day

of each term of the regular session. The last day of grace is generally printed on the registration coupon which the student is required to present at the Treasurer's office. Any student who fails to pay his tuition charges, fees, and other indebtedness to the University within the prescribed period of grace, is thereby dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is assessed a fee of $5 for the first week and $2 additional for each subsequent week in which the whole or any part of the debt remains unpaid, but the assessment in any case is not more than $15. The assessment may be waived in any instance for reasons satisfactory to the Comptroller and the Registrar, when such reasons are set forth in a written statement.

The rules governing the rate of tuition in cases of withdrawal during the term or of registration late in the term are stated in the *General Information Number*.

Any tuition or other fee may be changed by the Board of Trustees to take effect at any time without previous notice.

Other Fees

A matriculation fee of $10 is required of every student upon entrance into the University. This fee must be paid at the time of registration. A new undergraduate student who has made the required deposit of $25 with the Treasurer does not make an additional payment of the matriculation fee, because the Treasurer draws on the deposit for this fee. See page 23.

An infirmary fee of $5 a term is required of every student at the beginning of each term. For a statement of the privileges given in return for this fee, see the *General Information Number*.

A Willard Straight Hall membership fee of $5 a term is required of every undergraduate student at the beginning of each term. Its payment entitles the student to a share in the common privileges afforded by the operation of Willard Straight Hall, subject to regulations approved by the Board of Managers of the Hall. The fee of $5 a term is required of all graduate students except those who are members of the instructing staff, for whom membership is optional. The use of the hall is restricted to those who have paid this fee.

A physical-recreation fee is required, at the beginning of each term, of every undergraduate man and of every woman of the freshman and sophomore classes. This is $2 a term for men and $1 a term for women. Its payment entitles a man student to the use of the gymnasium and the university playgrounds, and to the use of a locker, bathing facilities, and towels, in the gymnasium, the New York State Drill Hall, or the Schoellkopf Memorial Building; and a woman student to the use of the women's gymnasium, recreation rooms, and playgrounds, and to the use of a locker.

A graduation fee is required, at least ten days before the degree is to be conferred, of every candidate for a degree. For a first, or baccalaureate, degree, the fee is $10; for an advanced degree it is $20.

Laboratory fees to cover the cost of materials used by the student are charged in courses that require work in laboratory, shop, or drafting room, or field work.

Deposits are made in advance at the Treasurer's office in some courses, particularly in Chemistry. Charges for materials used are entered against the deposits, and at the end of the term any balance remaining is returned to the student.

An average allowance of $30 a year will probably cover laboratory fees for most students, though for the first year a larger sum is likely to be required.

Rules Governing Minor Delinquencies

Every student is held personally responsible for any injury done by him to any of the University's property.

Assessments, charged to the student's account and payable at the Treasurer's office, are levied upon the student in certain circumstances, under the following rules of the University.

A student desiring to be reinstated after being dropped from the University for delinquency in scholarship or in conduct shall first pay a fee of $25.

A matriculated student desiring to register after the close of registration day shall first pay a fee of $5.

A student desiring to file his registration of studies after the date set by this College for filing the same shall first pay a fee of $2.

A student desiring to take an examination or other test for the removal of a term condition (including the making-up of a mark of "absent" or "incomplete") shall first pay a fee of $2 for each examination or other test.

A student desiring to make an appointment for the required medical examination or conference after twenty days from the last registration day of the term shall first pay a fee of $2.

For reasons satisfactory to the proper authority, any of the above-mentioned assessments (except that levied for examination or other test to remove a condition) may be waived in any individual case if the student's failure to comply with the regulation was due to ill health or to any other reason beyond his control. Application for such a waiver should be made to the Secretary of the College, or, in the case of the medical examination, to the chairman of the Faculty Committee on Health.

BOARD AND LODGING

Halls and lodging for men. The University has eight residential halls for men, offering accommodations for about 550 students. For particulars, address the Manager of Residential Halls, Morrill Hall, Ithaca, New York.

Many private lodging houses near the University offer furnished rooms, with heat and light, at rates ranging from $3 to $6 a week for a single room. Before he rents a room in a private house, a student should make sure, by a personal inspection, that the sanitary arrangements of the house are good, and he should especially insist on a good fire escape. The University publishes a list of lodging houses which have been inspected and found to be satisfactory in the above respects; the list is ready for distribution on August 15. New students, if they have not already engaged rooms, are advised to come to Ithaca and do so a few days before the day set for registration. The Freshman Advisory Committee offers its help to new students, and sends them a circular letter of suggestions about September 1.

The number of private houses that offer both rooms and board is small, and most students get their meals outside the houses where they live. The University conducts a cafeteria in Cascadilla Hall and another in Willard Straight Hall, and the College of Home Economics also has a public cafeteria. There are other good cafeterias which are patronized mainly by students.

The average cost of board and lodging in Ithaca is rather above than below $12 a week, and this amount would best be regarded as the lowest practicable allowance.

Halls for women. All women students are required to live in the residential halls, Sage Hall and Prudence Risley Hall, reserved for juniors and freshmen, and four units of the new dormitory group, reserved for sophomores and seniors. In these buildings the total cost of board, laundry, and rent of furnished room with heat and light, is $560. Exceptional circumstances which seem to make living outside of these buildings necessary should be taken up with the Dean of Women. Inquiries about board and rooms in the women's halls should be addressed to the Manager of Residential Halls, Morrill Hall, Ithaca, New York.

SCHOLARSHIPS

The State University Scholarships

Under Chapter 292 of the Laws of 1913, as amended by Chapter 502, Laws of 1920, and Chapter 130, Laws of 1924, the State of New York maintains scholarships, five of which are awarded each county annually for each assembly district therein. Each of these scholarships entitles the holder to $100 for each year while he is in attendance upon an approved college in this State during a period of four years. These are called the State University Scholarships. At Cornell they

are commonly known as the State Cash Scholarships, to distinguish them from the State Tuition Scholarships in this University. They are awarded by the State Commissioner of Education at Albany, to whom application should be made for any information about the conditions of award, or for any information about the rules of administration.

The University Undergraduate Scholarships

Eighteen University Undergraduate Scholarships, each continuing for two years and having an annual value of $200, are offered each year to members of the incoming freshman class. The award is made on the basis of a special competitive examination held in Ithaca in September, between the period of the entrance examinations and the opening of the University. Every candidate for a University Undergraduate Scholarship must have satisfied in full the entrance requirements of that college of the University which he proposes to enter. See the *General Information Number* for the rules under which these scholarships are awarded.

The Roberts Scholarships

The Roberts Scholarship Fund, a gift of the late Dr. Charles H. Roberts, of Oakes, Ulster County, New York, provides five scholarships, each retainable for one year. As expressed by the founder, the purpose of these scholarships is to furnish financial assistance to students in the College of Agriculture who are of good moral character, who show native ability, tact, and application, and who are in need of such assistance, especially students coming from rural districts. The award is made after the close of each year. Application blanks and copies of the regulations may be obtained at the office of the Secretary of the College of Agriculture. All applications must be on the official blanks, which, with all other information, must be filed with the Secretary of the College before June 1. The value of each scholarship is $320.

Dreyfus Memorial Scholarships

Two scholarships of an annual value of $600 each have been established by Mrs. Berta E. Dreyfus in memory of her husband, Dr. Louis A. Dreyfus. In their award preference is given first to students coming from the high schools of Richmond County, New York, and next to those from Sandusky County, Ohio. First consideration is given to those specializing in Chemistry, Engineering, or Agriculture, or, in the case of women, in Home Economics or Arts and Sciences. Application must be made to the Dean of the University Faculty before the first Wednesday of May.

Hervey S. Hall Scholarship

The Hervey S. Hall Scholarship, established by bequest of Miss Mary F. Hall, of Spencer, New York, and having an annual value of approximately $150, is to be awarded to a properly qualified student of either sex, a resident of New York, pursuing a course in Agriculture or Forestry leading to the degree of bachelor of science, and in need of financial aid. It is "to be granted first to a student from the town of Spencer, New York, should a suitable candidate appear, or else to a student from Tioga County, or from the State at large."

The New York Florists Club Scholarships

The New York Florists Club offers for 1931–32 three scholarships, each having a value of $300, divisible at the discretion of the faculty. These awards are to be made to students of the junior or the senior class who are specializing in the field of Floriculture and Ornamental Horticulture. Applications for these scholarships should be made to the Secretary of the College by June 1.

Other Scholarships

A description of other scholarships open under certain conditions to undergraduates in the College of Agriculture will be found in the *General Information Number.*

PRIZES

The Eastman Prizes for Public Speaking

With the object of developing qualities of personal leadership in rural affairs, Mr. A. R. Eastman, of Waterville, New York, established annual prizes, the first of $100 and the second of $20, for public speaking on country-life subjects. These prizes are designated the Eastman Prizes for Public Speaking. Competition is open to any regular or special student in the College of Agriculture. The contest takes place in February.

The Farm Life Challenge Prize

To stimulate the study and public discussion of vital farm-life problems, an anonymous donor has established annual prizes, the first of $100 and the second of $50. The contest of 1931–32 will be in the form of a debate. Preliminary trials will be held in December, on a subject to be announced. The final competition will be held in Farm and Home Week. All regular or special students are eligible.

The Ring Memorial Prizes

By bequest of Mr. Charles A. Ring, of Niagara County, New York, a first prize of approximately $30 and a second prize of approximately $20 have been established, to be awarded to undergraduate students in Agriculture who, in essays giving reviews of the literature on prob-

lems in floriculture, vegetable gardening, or pomology, show the greatest ability to evaluate scientific evidence. While contestants will need to review the literature of the problem considered, it is suggested that, in general, the essay submitted should not include such a review but should instead be limited to a critical evaluation of a single piece of investigation. The essays must be submitted to the Secretary of the Faculty of Agriculture by noon on May 1.

The Stewart Prize for the Production of Clean Milk

With the object of increasing the interest in the production of clean milk, Mr. S. L. Stewart, of Brookside Farm, Newburgh, New York, has offered for the coming year a prize of $50 to be divided among students participating in a clean-milk contest. This money is to be apportioned by the Department of Dairy Industry, and the regulations governing the contest are to be fixed by the department. Definite announcement concerning the contest will be made to students taking course 102 in Dairy Industry, soon after the course opens in February.

The Charles Lathrop Pack Prize

The Charles Lathrop Pack Prize, the income from a gift of $1000, is awarded annually by the staff of the Department of Forestry to that member of the senior class of professional forestry students who has maintained the best all-round record during his college course. In selecting the recipient, the staff is guided not only by scholastic standing, but as well by the general attitude displayed in classroom and laboratory, in the field, and in matters that have to do in general with furthering the welfare of the Department of Forestry.

The Charles Lathrop Pack Foundation Forestry Prize

The Charles Lathrop Pack Foundation Forestry Prize consists of the income from a fund of $1000, and is awarded annually in April for the best essay on forestry submitted by a professional forestry student. The purpose of the prize, as expressed by the donor, is "to aid in training foresters to write articles which will arouse in the public an interest in forestry and an appreciation of what forestry means to the country." The award is made by a committee appointed by the President of the University. The detailed regulations will be furnished by the Forestry Department or at the Secretary's Office. The essay must be deposited at the office of the head of the Department of Forestry by noon of April 15.

Alumni Prize

The Alumni Association of the College of Agriculture contributes an annual prize of $25 to be awarded at the close of the junior year to the student who has maintained the best scholastic record during his three years in the University, the award to be made by the Faculty of the College.

Alpha Zeta Cup

The Alpha Zeta fraternity has presented a prize cup to be awarded for custody for one year to the male student in the College of Agriculture making the best scholastic record during the freshman year. For students first admitted in the second term, the average of three terms' work will be considered. Presentation of the cup is made at the opening of the fall term.

Other Prizes

For information concerning other prizes offered in the University and open to competition of students in the College of Agriculture, see the special pamphlet on prizes, which may be obtained upon application to the Secretary of the University.

Loans

The New York State Grange has established a loan fund to aid its members in obtaining a higher education. Applications may be made to Mr. H. M. Stanley, Skaneateles, New York.

A fund contributed by students of the College is available for small, short-time, emergency loans. Application may be made to the College Secretary.

A fund, the interest on which is available for loans to students specializing in Floriculture, has been established by Mr. Max Schling of New York City.

Another loan fund for students of Floriculture, with principal and interest available, has been contributed by the New York Florists Club. Applications for loans from this and the preceding fund may be made to the College Secretary.

Notice of other loan funds, available to students of all colleges in the University, will be found in the *General Information Number*.

INFORMATION CONCERNING COURSES

The resident instruction in the College of Agriculture is organized, for the most part, in a course of four years, or eight terms, leading to the degree of bachelor of science. The requirements for graduation that are stated below apply to all students in this course and they are of such a nature as to give opportunity for following specialized interests under the guidance of faculty advisers.

From 70 to 80 per cent of the men graduates of the College go into agricultural pursuits. Besides farming, which is the most common occupation followed, there is a great range of related professional or technical vocations, for which the course in this College offers training. Manufacturing dairy products, teaching agriculture, agricultural extension, work in agricultural experiment stations, and administrative work in farmers' organizations dealing in agricultural products and machinery, may be cited as examples of these vocations. No required curricula are laid out for these specializations, but the student, with the help of a faculty adviser, can map out such a course within the general requirements for graduation.

In Forestry there are provided such courses as are needed by farmers for the proper management of farm woodlots, and a professional course is outlined on pages 56 and 57.

For those who cannot plan to take four years of college work, special curricula are organized, running through one or two years and giving specific training for definite vocational objectives.

Aside from the above, there are a twelve-weeks winter course not giving credit toward a degree; a six-weeks summer school designed especially for teachers, school principals, and superintendents; and a special school of biology held in connection with the summer school. There are also one- and two-weeks courses with very specific purposes.

The information contained in this announcement applies specifically to the four-years course. Circulars describing the other courses referred to may be obtained on application to the Secretary of the College.

Inquiries regarding graduate work in Agriculture should be addressed to the Dean of the Graduate School.

THE FOUR-YEARS COURSE

The Application for Admission

Besides satisfying the scholastic entrance requirements, candidates for admission must meet the following conditions:

Men who are candidates for admission to the four-years course must be at least sixteen years of age; women must be at least seventeen years of age. They must have certificates of good moral charac-

ter; and students from other colleges or universities are required to furnish from those institutions certificates of honorable dismissal. Students are admitted on examination, or on presenting acceptable credentials of the University of the State of New York, or on acceptable school certificates.

Prospective students who have neither lived on farms nor had considerable practical experience in agriculture are urged to spend at least one year on a well-managed farm in order to familiarize themselves with common farm affairs and operations before entering the College. This experience is necessary in order to meet the farm-practice requirement (pages 26 and 52).

Every candidate for admission to an undergraduate course must deposit $25 with the University. Candidates are warned not to send cash through the mails. A check, draft, or money order should be payable to Cornell University and should be sent to the Office of Admissions, Cornell University. The deposit must be made not later than August 1 if the candidate is to be admitted in September and not later than January 1 if he is to be admitted in February.

If the candidate matriculates, the deposit will be credited to his account, $10 for the matriculation fee and $15 as a guaranty fund, which every undergraduate student is required to maintain and which is to be refunded upon his graduation or permanent withdrawal, less any indebtedness to the University.

If admission is denied a candidate, the deposit is refunded in full at any time.

A candidate may withdraw the application for admission, but a charge of $10 is regularly made for accrued expenses unless the application is withdrawn and a refund of the deposit in full is claimed before August 1. If an application is not withdrawn until after August 1, but is withdrawn before August 31, the $10 charged for accrued expenses is deducted and $15 of the deposit is refunded. No refund is made to an applicant who withdraws the application after August 31.

In the case of applications for admission in February, a withdrawal after January 1 incurs the regular charge of $10, and no refund is made for withdrawal after January 31.

Every candidate for matriculation must submit to the Director of Admissions a satisfactory certificate of vaccination against smallpox, not later than August 1 if he is to be admitted in September, or not later than January 1 if he is to be admitted in February. It will be accepted as satisfactory only if it certifies that within the last five years a successful vaccination has been performed or three unsuccessful attempts at vaccination have been made.

Candidates for admission must file their credentials and obtain permits for any necessary entrance examinations at the office of the Director of Admissions, Morrill Hall. The results of entrance examinations may be ascertained from the Office of Admissions.

Entrance Requirements for the Four-Years Course

The subjects that may be offered for admission to the College of Agriculture are named in the following list; the figure in parenthesis following each subject indicates its value in entrance units and shows

the maximum and the minimum amount of credit allowed in the subject. A unit represents five recitations a week for one year in a study.

1a.	English No. 1	(1½)	
1b.	English No. 2	(1½)	
1c.	English (elective)	(1)	
2a.	First Year Greek	(1)	
2b.	Second Year Greek	(1)	
2c.	Third Year Greek	(1)	
3a.	First Year Latin	(1)	
3b.	Second Year Latin	(1)	
3c.	Third Year Latin	(1)	
3d.	Fourth Year Latin	(1)	
4a.	First Year German	(1)	
4b.	Second Year German	(1)	
4c.	Third Year German	(1)	
4d.	Fourth Year German	(1)	
5a.	First Year French	(1)	
5b.	Second Year French	(1)	
5c.	Third Year French	(1)	
5d.	Fourth Year French	(1)	
6a.	First Year Spanish	(1)	
6b.	Second Year Spanish	(1)	
6c.	Third Year Spanish	(1)	
6d.	Fourth Year Spanish	(1)	
7a.	First Year Italian	(1)	
7b.	Second Year Italian	(1)	
7c.	Third Year Italian	(1)	
8a.	Ancient History	(½–1)	
8b.	Modern History	(½–1)	
8c.	English History	(½–1)	
8d.	American History, Civics	(½–1)	
9a.	Elementary Algebra	(1)	
9b.	Intermediate Algebra	(1)	
9c.	Advanced Algebra	(½)	
9d.	Plane Geometry	(1)	
9e.	Solid Geometry	(½)	
9f.	Plane Trigonometry	(½)	
10.	Physics	(1)	
11.	Chemistry	(1)	
12.	Physical Geography	(½–1)	
13.	Biology*	(1)	
14.	Botany*	(½–1)	
14a.	Zoology*	(½–1)	
15.	Bookkeeping†	(½–1)	
16.	Agriculture including Home Economics†	(½–4)	
17.	Drawing	(½–1)	
18.	Manual Training	(½–1)	
19.	Any high-school subject or subjects not already used	(½–2)	

For admission to the New York State College of Agriculture, an applicant must offer either A or B, as follows:

A. Fifteen units, arranged as follows: English (3), history (1), elementary algebra (1), plane geometry (1), foreign language (3 units in one language or 2 units in each of two), elective (6 or 5). Solid geometry, physics, and plane trigonometry are recommended for inclusion among the elective units for students entering the course in forestry.

B. The New York State Academic Diploma in Agriculture, with the proviso that elementary algebra, 1 unit, and plane geometry, 1 unit, are included. While the diploma, with the proviso indicated, gives full entrance, a student entering upon it and therefore not presenting a foreign language, will be held to include in the elective courses he takes toward his degree, an amount of work corresponding to his shortage in foreign language in one or more of the following subjects: foreign language, English, mathematics, philosophy, psychology, history, economics, political and social science.

Admission with Advanced Standing

A student admitted to the College of Agriculture from another college in Cornell University, or from any other institution of collegiate rank, will be regarded as having completed the number of terms

*If an applicant has counted Biology (1), he may not also offer Botany (½) or Zoology (½).

†An applicant may offer not to exceed four units in vocational subjects under numbers 16, 18, and 19, combined. Bookkeeping may not be offered together with more than one of the subjects listed under 16, 17, and 18.

and hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to obtain the degree of bachelor of science, he must have completed the prescribed subjects in the four-years course and the requisite number of elective hours in agricultural subjects. He must also have been in residence in the College of Agriculture for his last two terms and have completed not less than fifteen hours a term, of which two-thirds, at least, must be subjects taught by the staff of the College of Agriculture.

Credit toward a degree for work done in a preparatory school on subjects that may be offered for entrance to the University will be given to those students only who, in addition to satisfying all entrance requirements, pass separate examinations in the subjects for which they seek college credit. These examinations will cover substantially the same ground as the university courses in the subjects. An applicant desiring a college-credit examination of this kind must apply to the Office of Admissions as early as possible, and at least twenty-four hours before the first examination, specifying which fifteen units he intends to offer in satisfaction of the entrance requirements, and on what other entrance subjects he wishes to be examined for credit. In case he fails to satisfy the entrance requirements in any one or more of the units on which he proposes to enter, but passes the credit examination in any other subject or subjects, he may use the latter toward satisfying entrance requirements, but in that case he cannot also receive college credit for it. The college-credit examinations will be held September 21 to 25, 1931, on the dates set for the entrance examinations in the same subjects.

A student who receives at entrance twelve or more hours of credit in addition to the requirements for admission may be regarded as having satisfied one term of residence. Under no circumstances shall surplus entrance credit based on extra work done in a preparatory school be accepted as the equivalent of more than one term.

A student who has satisfied the entrance requirements of this College, and has afterwards completed in two or more summer sessions in Cornell University at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in summer sessions be accepted as the equivalent of more than two terms of residence. The maximum amount of credit toward the degree of bachelor of science which is allowed for the work of any one summer session is eight hours.

Requirements for Admission of Special Students

Opportunities are provided for persons who desire to pursue special studies. In order to be eligible for admission to special work, applicants must offer two full years of recent farm experience and must

also either have fifteen units of entrance credits or be twenty-one years of age. In addition, an applicant for admission on the age requirement must satisfy the faculty of his ability to perform the work; and every applicant must satisfy the faculty of his bona-fide desire for special study. He will be required to present an honorable dismissal from the school last attended, certificates of good moral character, and other such certificates and letters as may be desired. The special work is designed to meet the needs of young men and young women from farms who have not time for a four-years course, and of mature persons who desire to spend a brief period in specialized study. The work is not a definite "course," in the sense of having a program or a prescribed set of studies. The student chooses any of the agricultural "electives" that he is fitted to pursue. Admission as a special student does not admit to classes. The student is admitted to the various classes by the heads of the departments concerned, but only after admission to the College.

Special students must leave a record of their farm experience with the office of Farm Practice during registration week.

Other Details of Admission

Other details as to subjects and methods of admission are given in the *General Information Number*, which may be obtained on application to the Secretary of the University.

For admission to the freshman class and to advanced standing from other colleges and universities, all communications should be addressed to the Director of Admissions of the University. Details are given in the *General Information Number*.

For admission as a special student, communications should be addressed to the Secretary of the College of Agriculture.

For admission to graduate work and candidacy for advanced degrees, communications should be addressed to the Dean of the Graduate School.

Requirements for the Degree of Bachelor of Science

The requirements for the degree of bachelor of science are residence for eight terms, and, in addition to the prescribed work in the Departments of Physical Training and Military Science and Tactics, the completion of one hundred and twenty-two hours of required and elective work, as outlined on page 27.

All men students must satisfy the farm-practice requirement before the beginning of the senior year. This requirement is the equivalent of a year or more of actual farm work. In order to meet it, students should have a good working knowledge of horses, cattle, sheep, swine, poultry, crops, and machinery, and of the ordinary farm operations as they are practiced on a general farm. Students should complete the requirement as early in their course as possible, since it is a prerequisite for admission to certain courses. Exemption from this

requirement is allowed only to students specializing in the Departments of Botany, Forestry, Bacteriology, or Entomology. Application for such exemption must be made at the office of the Secretary of the College not later than the close of the sophomore year.

Freshmen are required to attend, during their first term, a course designed to orient students in the life of the University and specifically to acquaint them with the scope and purpose of the courses of instruction in the College. The course requires attendance two hours a week and carries one hour of credit.

The Courses Leading to the Degree of Bachelor of Science

(Those required courses which are given in other colleges than Agriculture are described on pages 76–78.)

Freshman Orientation Course	1
English	6
Botany, Biology, or Zoology	6
Chemistry or Physics	6
Physiology, one of the following	3
Physiology of Domestic Animals	
Human Physiology	
Plant Physiology	
Economics	5
Hygiene 1 and 2	2
Botany, Zoology, Bacteriology, Chemistry, Physics, Geology, Physical Geography, Mathematics, Drawing, Biology, Psychology, Economics 1, 5, 81, Accounting, Sociology	18
Agriculture (including any courses listed in this announcement on pages 31–75)	55
Elective (either in Agriculture or in any other college in the University)	20
Total	122

REGISTRATION FOR COURSES

In selecting his course, the student must obtain the approval of a faculty adviser, preferably in the department in which he expects to specialize, who shall be chosen by the student at the beginning of the sophomore year. All students who are preparing for teaching are advised to consult a professor of rural education as well as their faculty adviser before filing their term schedules.

If students who have met the above requirements desire to take courses outside of the College of Agriculture in addition to those required or allowed free in the foregoing list, they may do so upon paying for the additional hours at the rate of tuition prevailing in the colleges where the courses are taken.

A student must register for at least twelve hours each term, and no new student may register for more than eighteen hours.

Necessary changes of registration must be made within the first ten days of a term.

The schedule of the freshman year must include the orientation course, hygiene, and six hours in each of the five following subjects or groups of subjects: (1) English; (2) chemistry or physics; (3) biology, botany, or zoology; (4) other specifically required courses listed above or courses in the eighteen-hour science group; (5) elective courses in the College of Agriculture.

Students who do not present chemistry for entrance are required to take chemistry.

Students who do not present physics for entrance are required to take physics.

Students who do not present geology or physical geography for entrance are required to take one of these subjects.

Professional students in forestry who do not offer plane trigonometry for entrance are required to take this subject in their freshman year.

In the eighteen hours of optional science work listed above, applied-science courses may not be counted. Thus dairy bacteriology may not be included as bacteriology for this requirement.

Students may not register for more than fifteen hours if in the preceding term their grades did not average as high as C.

The following courses are open to freshmen, subject to the requirements stated above, provided, also, that prerequisites are satisfied and that acceptable equivalents have not been credited toward entrance:

Agricultural Engineering 1, 10, 21, 24, 40, 41, 46, 47.
Agronomy 1, second term.
Animal Biology 1, 300, 303.
Animal Husbandry 1, 10, 50, 60.
Astronomy 18
Bacteriology 3.
Biology 1.
Botany 1.
Chemistry 101, 105, 205, 210, 225, 825.
Dairy Industry 1, 101, 102.
English 1.
Entomology 15, 21, 30a, 30b.
Floriculture and Ornamental Horticulture 5.
Forestry 1, 3, 4, 24, 53.
French 1, 3, 4a, 4b, 5a, 5b, 6.
Geology 100, 101, 200, 201, 311, 400.
German 1, 1a, 3, 3a, 4, 5, 8.
Government 1.
Greek 1a, 1b, 2a, 2b.
History 1, 61.
Italian 1, 4.
Latin 1a, 1, 2.
Mathematics 1, 2, 2f, 3, 4, 5, 7, 15.
Meteorology 1, 2.
Music 1, by examination.
Philosophy 3.
Physics, 3, 4.
Pomology 1.
Poultry Husbandry 1, 3, 31, 31a, 137.
Rural Education 1, 7.
Spanish 1, 3, 4, 5, 6.
Vegetable Crops 1, 2.
Zoology 9.

For work in the following courses, students must obtain class assignments from the departments concerned before the registration card can be accepted at the Secretary's office. For this purpose the appropriate study-card coupon should be stamped or initialed by departmental representatives. Unless announcement to the contrary is made, these representatives are available in Roberts Assembly during registration days. Assignments in classes other than in the College of Agriculture are separately announced.

Agricultural Economics and Farm Management 103.
Agricultural Engineering, all courses.
Agronomy, all courses.
Animal Husbandry 1, 10, 20, 50, 90.
Bacteriology 2.
Biology 1.
Botany 1, 13, 124, 125, 31.
Drawing 2, 11, 12, 13, 14, 15.
Entomology 12, 41, 51, 52, 241.
Extension Teaching 101, 102, 103, 104.
Floriculture and Ornamental Horticulture 5, 6, 8, 31, 51.
Forestry, all courses except 3.
Meteorology 1.
Plant Breeding 101, 103, 201.
Plant Pathology 1, 2, 121, 122, 201, 221, 222, 241.
Pomology 1, 111, 112, 121, 131, 201.
Poultry Husbandry, all courses.
Rural Education 111.
Rural Social Organization 121, 122, 123.
Vegetable Crops 1, 2, 12.
Zoology 8, 9.

PREREQUISITES

Where an option of required courses is offered, consideration should be given to the prerequisites demanded by the elective courses to be taken subsequently.

Agronomy 1 is prerequisite for Agricultural Engineering 122, Bacteriology 107, and Floriculture and Ornamental Horticulture 3 and 121.

Bacteriology 1 is prerequisite for Agronomy 107 and Dairy Industry 102.

Botany 1 is prerequisite for further work in botany; for professional courses in forestry; for courses in plant breeding and plant pathology; and for some of the courses in agronomy, floriculture and ornamental horticulture, and vegetable crops.

Botany 13 is prerequisite for Forestry 121 and 124.

Botany 22 is prerequisite for Forestry 140 and 141.

Botany 31 is prerequisite for professional courses in forestry, and for courses in floriculture and ornamental horticulture, plant breeding, pomology, and vegetable crops.

Botany 124 is prerequisite for Plant Breeding 201.

Chemistry 101 is prerequisite for courses in agronomy, bacteriology, dairy industry, and floriculture and ornamental horticulture.

Chemistry 210 and 225 are prerequisite for Agronomy 107, 201, and 202, and recommended for Dairy Industry 101.

Drawing 1 is prerequisite for Agricultural Engineering 1 and 102.

Drawing 2 is prerequisite for Agricultural Engineering 161, 166.

Drawing 11 is prerequisite for Floriculture and Ornamental Horticulture 61a and 62a.

Economics 1 is prerequisite for Agricultural Economics 121, 125, 141, 161, 250, and 262, and Forestry 3.

English 68 is prerequisite for Extension Teaching 117.

Geology 100 is prerequisite for Agronomy 1 and 2.

Physics 3 and 4 are prerequisite for Agricultural Engineering 161.

Plane Trigonometry and courses in surveying are prerequisite for Forestry 144.

Plant Breeding 1 is prerequisite for Animal Husbandry 120.

Rural Social Organization 1 is prerequisite for Extension Teaching 119.

Veterinary Physiology 10 is prerequisite for Animal Husbandry 110.

GRADUATED CREDIT

The passing grades are designated A, B, C, D, and P. In courses taken in the College of Agriculture, students meriting grade C receive normal credit toward graduation; grade B, 10 per cent additional credit; Grade A, 20 per cent additional credit; grade D, credit reduced 10 per cent; and grade P, credit reduced 20 per cent. No student may be graduated in less than eight terms unless his work in the College of Agriculture averages 10 per cent excess credit.

COMBINED COURSE IN AGRICULTURE AND VETERINARY MEDICINE

Inasmuch as the requirements for graduation of the College of Agriculture and of the College of Veterinary Medicine are to some degree the same, it is possible, by a judicious use of elective hours, to complete the requirements in both colleges in seven or in six and a half years.

DEPARTMENTS OF INSTRUCTION

WITH OUTLINES OF COURSES THAT MAY BE CHOSEN BY REGULAR OR SPECIAL STUDENTS AS AGRICULTURAL ELECTIVES

Special Notices

The first term begins with the opening of the college year, in September. The second term begins in February. (See calendar, page 2.)

Unless otherwise noted, all courses are given in the buildings of the College of Agriculture. Courses inclosed in brackets will not be given in 1931–32.

Courses numbered from 1 to 100 are open to undergraduates generally; courses numbered from 101 to 200 are intended primarily for upperclassmen and graduates; courses numbered from 200 to 300 are intended primarily for graduates.

The main divisions of subject matter under which the courses are arranged are, for the most part, separate administrative units. The exceptions are bacteriology, which is administratively joined with dairy industry; meteorology, which goes with agronomy; zoology, which goes with entomology and limnology; drawing, part of which goes with floriculture and ornamental horticulture and part with agricultural engineering; and the course in Wild Life Conservation and Game Farming, which is given cooperatively.

AGRICULTURAL CHEMISTRY

Courses in agricultural chemistry are listed in the announcement of the College of Arts and Sciences.

AGRICULTURAL ECONOMICS AND FARM MANAGEMENT

Farm Management

101. **Farm Records and Accounts.** First term. Credit three hours. Open to all students who have fulfilled the farm-practice requirement. Lectures, T Th 8. Caldwell 100. Laboratory, M 1.40–4, East Roberts 232, or T 1.40–4, Farm Management Building 102. Assistant Professor Harriott and Mr. ———.

Farm inventories; cash accounts; income-tax reports; single-enterprise cost accounts; complete farm cost accounts; farm maps; other farm records. Interpretation of the results of cost accounts and their application in the organization and management of farms. Fee for materials furnished, $3.

102. **Farm Management.** Second term. Credit five hours. Open to sophomores, juniors, and seniors who have satisfied the farm-practice requirement. It is desirable that this course should be preceded by course 101 and by as many as possible of the courses dealing with the production of crops and of animals. Lectures, M W F 10. Farm Management Building 102. One laboratory period a week, by assignment. Farm Management Building 102. On days when farms are visited, laboratory work may last longer than two and one-half hours. Professor W. I. Myers and Mr. ———.

Farming as a business; types of farming; balance of business; size of business; rates of production; farm layout; building arrangement; labor management; machinery; marketing; ways of starting to farm; forms of tenure and leases; choosing and buying a farm; use of capital and credit; planning, organization, and management of specific farms. Four half-day field trips will be taken during April and May to visit farms in near-by regions. Fee for materials furnished, $3.

103. **Business Organization and Management of Successful New York Farms.** First term. Credit three hours. Open to seniors and to graduate students. Prerequisite, permission to register. F 1.40–4, S 8–1. Farm Management Building 102. Two or three two-day trips will be taken in October or early November, on

the regular class days. On days when out-of-town trips are taken, the class will usually leave before 1.40 p. m. and will not return until evening. Expenses for trips are estimated to be about $25. Professor SCOVILLE.

[201. **The Appraisal of Farm Land.** First term. Credit one hour. Professors WARREN and HILL.] Not given in 1931–32.

A study of factors governing the price of land; and the appraisal of land for use, for sale, for purposes of making loans, and for taxation.

202. **Research Methods in Farm Management.** First term. Credit one hour. T 11. Farm Management Building 102. Professor WARREN.

Attention is given to the more important methods of determining the principles of farm management and the preparation of results for publication.

203. **Research Methods in Farm Management.** Second term. Credit two hours. W 2–4. East Roberts 232. Professor MISNER.

This course is designed primarily for students who expect to engage in farm-management research. Much of the time is devoted to the preparation and use of forms for the collection of data by the survey method. During the spring vacation several days are spent in taking farm-management survey records. Experience is given also in the tabulation and the study of such data and in preparing the results for publication.

299. **Seminary.** First and second terms. Open only to graduate students. M 4.10–5.15. Farm Management Building 102. Departmental staff.

AGRICULTURAL PRICES AND STATISTICS

A section of Mathematics 4a, Analytical Geometry and Calculus, meeting at 11 o'clock with Professor Roos, is designed for students specializing in business, statistics, economics, prices, farm management, or agricultural economics. Attention is called also to Mathematics 83, Probability and Statistics, and Mathematics 90, Mathematical Economics.

111. **Agricultural Statistics.** First term. Credit three hours. Open to juniors, seniors, and graduate students. Lecture, M 8. East Roberts 212. Laboratory, M. 1.40–4. Farm Management Building 102. Professor PEARSON and Mr. GANS.

A study of the principles involved in the collection, tabulation, and interpretation of agricultural and marketing statistics. Analysis of statistical problems with an 80-column tabulating machine. This course is designed primarily for students who expect to pursue commercial work. Fee for materials furnished, $3.

112. **Agricultural Statistics, Advanced Course.** Second term. Credit three hours. Prerequisite, course 111. Lecture, M 8. East Roberts 222. Laboratory, M 1.40–4. Farm Management Building 102. Professor PEARSON and Mr. GANS.

A study of the application of probable error, sampling, gross, partial, and multiple correlation, curve fitting to problems in this field. Methods of using 80-column tabulating equipment for multiple-correlation analysis. This course is a continuation of course 111 and is intended primarily for students who expect to do research work. Fee for materials furnished, $3.

115. **Agricultural Prices.** Second term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, T Th 8. Laboratory, W 1.40–4. Farm Management Building 102. Professor PEARSON and Mr. ———.

A study of prices of farm products in relation to agricultural and industrial conditions. Fee for materials furnished, $3.

MARKETING

121. **Accounting.** First term. Credit three hours. Should be preceded or accompanied by Economics 1. Lectures, T Th 9. Caldwell 100. Laboratory, T or W 1.40–4. East Roberts 232. Assistant Professor CATHERWOOD.

The fundamentals of the double-entry system; the theory of debit and credit; the analysis and recording of ordinary business transactions; the trial balance; closing the books; preparation and analysis of financial statements. The principles are developed mainly in terms of the merchandising business. Fee for materials furnished, $1.

122. **Accounting, Advanced Course.** Second term. Credit three hours. Prerequisite, course 121 or its equivalent. Lectures, M W F 9. Farm Management Building 102. Professor POWELL.

Accounting problems of the corporation and the cooperative association; problems of valuation and income determination; the fundamentals of cost accounting; the use of accounts by the management of the business, with special reference to the analysis and interpretation of financial statements. Fee for materials furnished, $1.

125. **Business Organization and Management.** First term. Credit three hours. Open to juniors, seniors, and graduate students. Prerequisite, Economics 1. Should preferably be preceded or accompanied by course 121. Lectures, M W F 10. Farm Management Building 102. Assistant Professor CATHERWOOD.

A general survey of the principles of organization and management of the individual merchandising enterprise, with particular reference to agricultural business. Specific problems and cases are used to develop and illustrate the principles of organization, financing, methods of distribution, price policies, credit policies, sales research and planning, market analysis, and advertising. Fee for materials furnished, $2.

131. **Cooperative Marketing.** First term. Credit two hours. Open to juniors, seniors, and graduate students. Lecture, Th 11. Laboratory, Th 1.40–4. Farm Management Building 102. Professor W. I. MYERS.

Business management of cooperative organizations. The cooperative corporation; legal basis of cooperative business; types of cooperative organizations; contracts; relations to members. Primary consideration will be given to a study of some of the important factors affecting the efficiency of cooperative business. Fee for materials furnished, $1.

132. **Management of Cooperative Associations.** Second term. Credit two hours. Open to juniors, seniors, and graduate students. Prerequisite, courses 121 and 131. Lectures, T Th 9. Farm Management Building 102. Professor POWELL.

A study of the problems involved in the management of cooperative associations. Specific cases will be used to illustrate problems of ogranization, financing, membership relations, sales policies, and economy of operation. Fee for materials furnished, $1.

232. **Collective Bargaining.** Second term. Credit two hours. Open only to graduate students. Lectures, T Th 8. Farm Management Building. Professor BOYLE.

Collective bargaining and its use by labor, capital, and agriculture. The policy of collective bargaining. A study in price determination.

141. **Marketing.** First term. Credit four hours. Prerequisite, Economics 1. Open to juniors, seniors, and graduate students. Lectures, M W F 8. Farm Management Building 102. Discussion groups one hour a week. Professor BOYLE.

A study of the present organization, functions, and operation of the market structure, with particular reference to agriculture. Cooperative marketing is included. Fee for materials furnished, $2.

142. **Marketing (Fruits and Vegetables).** First term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, M W 9. Farm Management Building 102. Laboratory, W 1.40–4. Farm Management Building 102. Professor RASMUSSEN and Mr. ———.

A study of the economic factors involved in the marketing of fruits and vegetables. Regional and seasonal competition; areas of distribution; methods of handling; costs of marketing; types of marketing organizations; sales methods; transportation and carrier services; produce law and methods of credit rating; terminal problems. Fee for materials furnished, $2.

143. **Marketing (Dairy Products).** Second term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, T Th 10. Laboratory, T 1.40–4. Farm Management Building 102. Professor SPENCER.

Economic aspects of the distribution of the more important dairy products from producer to consumer, with special emphasis on market milk. One all-day trip will be arranged. Fee for materials furnished, $2.

145. **Business Law.** First term. Credit two hours. Open to juniors, seniors, and graduate students. Lectures, T Th 12. Farm Management Building 102. Lectures by Mr. Allan H. Treman. Registration in charge of Professor SPENCER.

Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business, including contracts, liens, mortgages, and negotiable instruments; ownership and leasing of property; wills; estates; inheritance taxation; and other practical problems.

146. **The Organized Exchanges and Speculation.** First term. Credit two hours. Open to graduate students and seniors with adequate preparation. Recitations, T Th 8. Farm Management Building 102. Professor BOYLE.

147. **Marketing of Perishable Farm Products in New York City.** Second term. Credit one hour. Open to upperclassmen and graduate students, and to others by permission. Professor RASMUSSEN or Professor SPENCER in charge. Professors WORK, HEINICKE, ROSS, SPENCER, and RASMUSSEN, and Assistant Professor HINMAN will assist in the course.

The entire time of the class for one week is spent in New York City inspecting and studying the marketing of perishable agricultural products; poultry and poultry products; dairy products; fruits; vegetables; meat and meat products. During the college year 1931–32, this trip is taken during the spring recess, April 4 to 9, inclusive. Necessary expenses per student should not exceed $60.

148. **Research in Marketing.** First and second terms. Credit, to be arranged. For seniors or graduate students who have done superior work in courses 141 and 146 or their equivalents. Farm Management Building 202A. Professor BOYLE.

242. **Methods and Results of Research in Marketing.** First term. Credit two hours. For graduate students. W 4–6. Farm Management Building 102. Professor RASMUSSEN.

A critical study of research projects in marketing, and practice in planning market research. The major part of the time is devoted to projects dealing with the marketing of fruits and vegetables.

243. **Methods and Results of Research in Marketing.** Second term. Credit two hours. For graduate students. W 4–6. Farm Management Building 102. Professor SPENCER.

A critical study of research projects in marketing, and practice in planning market research. The major part of the time is devoted to projects dealing with the marketing of dairy products.

RURAL ECONOMY

250. **Taxation.** Second term. Credit three hours. Open to juniors, seniors, and graduate students who have completed a beginning course in economics. Lectures, M W F 11. Farm Management Building 102. Assistant Professor KENDRICK.

The emphasis of the course is on state and local problems connected with rural taxation. Among the subjects considered are: the growth of expenditures; the rise of modern tax problems; how various governmental divisions in New York and other States get their tax revenues; the general-property tax and its administration, and the special cases of personal-property, farm, and forest taxation; mortgage taxes; taxation of cooperatives; income, inheritance, and gasoline taxes; proposals for tax reform; problem of a proper distribution of the tax burden among the various state and local governmental units. Fee for materials furnished, $2.

151. **Public Problems of Agriculture.** Second term. Credit two hours. Lectures, T Th 11. Farm Management Building 102. Professor WARREN.

A discussion of some of the more important problems of agriculture that involve collective or governmental action.

161. **Agricultural Economics.** Second term. Credit four hours. Prerequisite, Economics 1. Open to juniors, seniors, and graduate students. Lectures, M W F 8. Farm Management Building 102. Discussion groups one hour a week. Professor BOYLE.

A discussion of the major problems in the field of agricultural economics. A statement of these problems and the various resolutions proposed.

262. **Rural Economy, Elementary Course.** First term. Credit three hours. Prerequisite, an introductory course in economics. Open to seniors and graduate students. Lectures, M W F 9, and individual conferences. Fernow 210. Professor LAUMAN and Mr. BENNETT.

A study of the factors underlying the present conditions in rural communities at home and abroad, and of forces at work in shaping the agriculture of the world, chiefly along economic lines.

263. **Rural Economy, Advanced Course.** Second term. Credit four hours. Prerequisite, course 262 or its equivalent. Lectures, M W F 9. Fernow 210. Professor LAUMAN.

A more extended study, primarily theoretical, of the general economic problems of agriculture.

269. **Rural Economy Seminary.** First and second terms. Primarily for graduate students, and for seniors by invitation. T 2.30. Fernow 126. Professor LAUMAN.

The year's work is devoted to a study of Brentano, L.: "Lehrbuch der Agrarpolitik."

HISTORY OF AGRICULTURE

171. **History of Agriculture.** First term. Credit three hours. Open only to seniors and graduate students. Lectures, M W F 11. Fernow 210. Professor LAUMAN and Mr. BENNETT.

The important phases of the development of agriculture are considered historically. Special stress is laid on the rise of the agricultural classes, on the beginnings of rational agriculture, and on modern agrarian problems.

172. **History of Agriculture in the United States.** Second term. Credit three hours. Open only to seniors in all colleges and to graduate students. Lectures, M W F 11. Fernow 210. Professor LAUMAN and Mr. BENNETT.

This course deals with the land, its settlement, and its settlers in their economic, social, and political aspects; the technical development of agriculture; the beginnings of permanent agriculture; the rise of marketing problems and of the agrarian movements.

278. **Research in Rural Economy or History of Agriculture.** First and second terms. Credit two or three hours a term. For seniors who have done superior work in courses 171, 172, or 262, or their equivalents, and for graduate students. Fernow 126. Professor LAUMAN.

279. **Agricultural History Seminary.** First and second terms. Primarily for graduate students and for seniors by invitation. Th 2.30. Fernow 126. Professor LAUMAN.

The year's work is devoted to a general survey of George Washington's agriculture.

AGRICULTURAL ENGINEERING

1. **Farm Mechanics.** First or second term. Credit three hours. Planned to give basic training for understanding the farm applications of mechanical and electrical methods and appliances. Reasonable proficiency in drawing is necessary, and Drawing 1 is recommended as preparation for this course. Lectures, T Th 10. Dairy Building 119. Practice, M or T 1.40–4. Agricultural Engineering Laboratories. Professor RILEY and Messrs. WRIGHT and EASTMAN.

A course intended to develop ability to think and to reason in terms of mechanical and electrical devices. The machines used are the single-cylinder gas engine, the grain binder, pumps, spray machinery, domestic water-supply systems, and electrical equipment. Laboratory fee, $2.

102. **Farm Power Machinery.** Second term. Credit three hours. Prerequisite, course 1 and approved proficiency in drawing, and permission to register. Lectures, W F 8. Dairy Building 218. Practice, Th or F 1.40–4. Agricultural Engineering Laboratories. Assistant Professor FAIRBANKS and Mr. ———.

A course combining theory and practice for the purpose of developing an understanding of the multi-cylinder internal-combustion engine as it is applied to the tractor, the truck, and the automobile. The operation of electric power equipment. A study of modern power machinery used for farm and road work. Laboratory fee, $5.

10. **Household Mechanics.** Second term. Credit three hours. For women students. Lectures, T Th 12. Caldwell 143. Practice, Th 1.40–4, F 10–12.50, or F 1.40–4. Agricultural Engineering Laboratories. Professor ROBB and MESSRS. WRIGHT and EASTMAN.

A course intended to develop ability to think and to reason in terms of mechanical devices. Among the problems selected for this training are exercises in plumbing, soldering, and power transmission, and studies in the principles of operation, care, and repair of small mechanical devices, sewing machines, domestic electrical equipment, and automobile engines. Laboratory fee, $1.

21. **Farm Engineering.** First or second term. Credit three hours. It is recommended but not required that students have training in mechanical drawing. Lectures: first term, M W 9; second term, M W 10. Dairy Building 119. Practice, M or T 1.40–4. Dairy Building, Fourth Floor, and field. Professor MCCURDY.

A study of the practical solution of the elementary problems involved in connection with surveying and mapping the farm; leveling for farm drainage and water supply; laying out building foundations. Farm drainage, concrete, and sewage disposal are studied. Laboratory fee, $2.

121. **Farm Engineering, Advanced Course.** Second term. Credit two hours. Prerequisite, course 21 or its equivalent. Alternates with course 122. Lecture, T 10. Dairy Building 120. Field work, W 1.40–4. Professor MCCURDY.

A course in topographic surveying and mapping; leveling, including cross-section and earthwork computations; a study of the use and adjustments of the better class of levels and the transit. Laboratory fee, $1.

[122. **Drainage and Irrigation.** Second term. Credit two hours. Prerequisite, course 21 and Agronomy 1 or their equivalents. Alternates with course 121. Professors ROBB and MCCURDY.] Not given in 1931–32.

A course covering the principles and practice of drainage and irrigation; laying out drainage for farm lands, golf courses, gardens, and roads; a study of irrigation systems for humid climates; pumping plants for drainage, irrigation, and water supply. One two-day excursion to drainage projects near Ithaca is taken sometime in May. Laboratory fee, $1.

24. **Farm Concrete.** First term. Credit two hours. Lecture, T 11. Dairy Building 119. Practice, Th or F 1.40–4. Agricultural Engineering Laboratories. Professor MCCURDY.

A study of the selection, testing, and proportioning of the materials used in making concrete; building forms; mixing, placing, finishing, and curing concrete; waterproofing; inspection of local sand and gravel banks and of some local concrete structures. Laboratory fee, $1.

31. **Farm Structures.** First or second term. Credit three hours. Laboratory periods, T Th 10–11, and three two-hour practice periods by appointment. Dairy Building, Fourth Floor. Assistant Professor REYNA.

A study of the principles of design, including lighting, ventilation, sanitation, equipment, floor spacing, and construction, for barns, stables, and other farm buildings, and the application of those principles in the drafting room. Laboratory fee, 50 cents.

131. **Farm Structures, Advanced Course.** First or second term. Credit two or three hours. Prerequisite, course 31. Laboratory periods, T Th 10–11, and two or three two-hour practice periods by appointment. Dairy Building, Fourth Floor. Assistant Professor REYNA.

A study of the practical design of any major farm building other than that designed in course 31; preparation of specifications and bills of materials; study of strength of materials.

40. **Farm Shop Work.** First and second terms. Credit two hours. Open to all students. First term, any four hours, M T Th 1.40–4; second term, T Th 1.40–4. Agricultural Engineering Laboratories. Assistant Professor ROEHL.

This course includes woodworking with special jobs in carpentry, cabinet making, and fitting tool handles; metal working with special jobs in saw fitting, tool grinding, cold-metal working, sheet-metal working, selecting and attaching builders' hardware; forge work, with special jobs in shaping and tempering tools; painting, with special jobs in repairing and refinishing furniture; harness repairing; problems in the use of rope. Mechanical drawing and free-hand sketching are done as they supplement the work. Laboratory fee, $3.

41. **Shop Work for Rural High School Teachers.** First and second terms. Credit three hours. Prerequisite, course 40. First term, W or F 1.40–4 and S 8–12.50; second term, W 1.40–4 and S 8–12.50. Agricultural Engineering Laboratories. Assistant Professor ROEHL.

A course offering training for teaching general industrial-arts shop work in rural high schools. The course includes presentation of purpose, organization of course of study, and methods of teaching industrial-arts shop work. Laboratory fee, $3.

46. **Household Carpentry, Furniture Repairing and Refinishing.** Second term. Credit two hours. Practice, M F 1.40–4. Agricultural Engineering Laboratories. Assistant Professor ROEHL.

A course for girls in such carpentry-tool work as a housekeeper can make use of; the making and finishing of several small pieces of furniture; each student to refinish a few pieces of furniture supplied by her, and do such repairing as may be necessary. Laboratory fee, $3.

47. **Farm Blacksmithing.** First or second term. Credit one hour. Freshmen must obtain permission to register from the Farriery office. Practice, M or T 1.40–4. Farriery, Veterinary College. Professor ASMUS.

Welding of iron and ordinary steel such as is used in the parts of modern farm machinery; sharpening, shaping, and tempering of steel tools; miscellaneous forging, such as chain hooks, links, and so forth; horseshoing for those interested and competent. Laboratory fee, $3.

48. **Advanced Farm Blacksmithing.** First or second term. Credit one or two hours. Prerequisite, course 47 and permission to register. Practice, W 1.40–4. Farriery, Veterinary College. Professor ASMUS.

Advanced work in forging and horseshoeing. Laboratory fee, $3 for each credit hour.

251. **Research in Agricultural Engineering.** First or second term. Credit one or more hours. Prerequisite, adequate ability and training for the work proposed, and permission to register. Professors and assistant professors of the department.

Special work in any branch of agricultural engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

252. **Seminary.** First and second terms. Credit one hour a term. Open to seniors and required of graduate students. W 4.30–6.

Presentation and discussion of papers on special problems in agricultural engineering. Departmental staff.

Drawing. The courses in mechanical drawing formerly listed here are now to be found under *Drawing*.

COURSES FOR STUDENTS IN HOTEL ADMINISTRATION

161. **Mechanism of Hotel Machines.** First or second term. Credit four hours. Required. Prerequisite, Drawing 2, Physics 3 and 4, and hotel experience. Lectures: first term, M W F 9; second term, M W F 10. East Roberts 222. Laboratory, M T W Th or F 1.40–4. East Roberts 1. Professor RANDOLPH and Mr. SAYLES.

A study of the elements of machines as employed in the mechanical equipment of hotels: kitchen and laundry machinery, vacuum cleaners, the machine and

repair shop, communication systems, plumbing, illumination, and fire protection. A study of graphical representation is included. Laboratory fee, $5.

162. **Hotel Power Plants.** Second term. Credit three hours. Required. Prerequisite, course 161 and thirty points of hotel-practice credit. Lectures, W F 11. East Roberts 212. Laboratory, T W Th or F 1.40–4, or S 9–11.20. East Roberts 2. Professor RANDOLPH and Mr. SAYLES.

Representative types of steam boilers and their auxiliaries; properties of steam, fuels, combustion, firing methods, feed-water purification, and boiler testing; various types of steam engines; lubrication; pumps and their applications; testing of apparatus. Laboratory fee, $5.

163. **Hotel Auxiliary Equipment.** First term. Credit three hours. Required. Prerequisite, course 162. Lectures and recitations, W F 11. East Roberts 222. Laboratory, W Th or F 1.40–4, or T or S 9–11.20. East Roberts 2. Professor RANDOLPH and Mr. SAYLES.

Heating and ventilation; mechanical refrigeration systems; electrical machinery; elevators. Laboratory fee, $5.

164. **Hotel Planning.** Second term. Credit three hours. Open to a limited number of seniors with the consent of the instructor. Prerequisite, course 163. Hours to be arranged. Professor RANDOLPH.

Typical procedure in building construction; planning the layout for a proposed hotel, emphasizing floor plans and the selection and arrangement of the engineering equipment in the various departments; the use of metering devices in promoting efficient operation. Materials fee, $2.

166. **Hotel Maintenance.** First term. Credit one hour. Open to juniors and seniors. Prerequisite, Mechanical Drawing 2 and ten points of hotel-practice credit. Lecture, Th 9. East Roberts 222. Mr. SAYLES.

The usual methods employed by the trades in the maintenance and alteration of hotel structures (includes materials and methods of building construction); specification and repair of furniture.

AGRONOMY

1. **The Nature and Properties of Soils.** First or second term. Credit five hours. Prerequisite, Chemistry 101 and 105 and Geology 100. Lectures, M W F 9. Caldwell 100. One laboratory period, Caldwell 49. Two recitations, Caldwell 31. Professor BUCKMAN.

A comprehensive course dealing with the composition, properties, and plant relations of soils, with particular reference to the use of lime, fertilizers, and other means of maintaining soil fertility. Laboratory fee, $3.

2. **Forest Soils.** First term. Credit three hours. For forestry students only. Prerequisite, Chemistry 101 and 105, and Geology 100. Lectures, M W F 11. Caldwell 143. One laboratory practice. Caldwell 49. Professor BUCKMAN.

A course dealing with the nature, properties, and plant relationships of soils in general, and of forest and nursery soils in particular. The work is designed as a basis for those phases of silviculture that deal directly with the soil. Laboratory fee, $3.

3. **Practical Soil Management.** First term. Credit three hours. Prerequisite, course 1. Lectures, M W 9. Caldwell 143. One recitation by appointment. Professor WORTHEN.

A practical course dealing with methods of soil utilization, including the use of lime, commercial fertilizers, stable manure, and green-manure crops, in agricultural practice. It includes a study of the influence of crop rotations and fertilizers on the productivity of soils, as shown by field experiments. Particular stress is placed upon factors essential for the practical utilization of New York soils.

11. **Production of Field Crops.** First term. Credit four hours. Prerequisite, course 1 and Botany 1 or Biology 1. Lectures, M W F 10. Caldwell 100. One laboratory practice. Caldwell 250. Mr. GOODDING.

A course dealing with the principal field crops of the United States, special emphasis being placed upon those grown in the Northeastern States. Cultural

methods, crop rotations, fertilizer practices, soil and climatic adaptation, and the better varieties of the important crops, are considered. Laboratory fee, $3.

107. **Soil Bacteriology.** Second term. Credit three hours. Prerequisite, course 1, Bacteriology 1, and Chemistry 210 and 225. Lecture, W 8. Caldwell 143. Laboratory, W F 1.40–4. Caldwell 201. Professor J. K. WILSON.

A course in biological soil processes designed primarily for students specializing in soil technology and bacteriology. The laboratory work is supplemented by reports and by abstracts of important papers on the subject. Laboratory fee, $5.

201. **Soils, Advanced Lecture Course.** First term. Credit three hours. Prerequisite, course 1 and Chemistry 210 and 225. Students must consult Professor Bizzell before registering for this course. Lectures, T Th S 8. Caldwell 143. Professor BIZZELL.

An advanced course designed primarily for students specializing in soil technology. The lectures deal with the important properties of soils from the theoretical and technical standpoints. Review of the literature and preparation of papers are important parts of the work.

202. **Soils, Advanced Laboratory Course.** First term. For graduate students only. Prerequisite, course 1 and Chemistry 225 or its equivalent. Hours by appointment. Caldwell 201. Professor BIZZELL.

A course designed primarily for special training in methods used in soil investigation.

221. **Research.** Throughout the year. For graduate students only. Hours by appointment. Caldwell 350. Professors LYON, BIZZELL, BUCKMAN, J. K. WILSON, and ROMELL, and Assistant Professor B. D. WILSON.

222. **Seminary.** Throughout the year, without credit. Required of graduate students taking work in the department. S 11–12.30. Caldwell 143.

ANIMAL HUSBANDRY

Students intending to specialize in animal husbandry are advised to register for courses 1, 10, and 20 before taking the more advanced courses.

1. **Livestock Production.** First term. Credit three hours. Lectures, W F 10. Animal Husbandry Building A. One laboratory period, M 10–12.20, W 11–1, Th 1.40–4, or F 1.40–4. Judging Pavilion. Professors SAVAGE and HARPER, Assistant Professor HINMAN, and Mr. J. P. WILLMAN.

Introduction to types, breeds, judging, and management of livestock. Laboratory fee, $2.

10. **Livestock Feeding.** Second term. Credit three hours. Prerequisite, course 1. Lectures, T Th 9. Animal Husbandry Building A. One laboratory period, M 1.40–4, T 10–12.20, W 11–1, or Th 1.40–4. Professor MORRISON and Messrs. TURK and ———.

The feeding of farm animals, including the general basic principles, feeding standards, the computation of rations, and the composition and nutritive value of livestock feeds.

110. **Animal Nutrition.** First term. Credit three hours. For advanced and graduate students. Prerequisite, course 10 and a course in human or veterinary physiology. A course in organic chemistry is advised but is not required. Lectures, M W F 10. Animal Husbandry Building B. Professor MAYNARD.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

111. **Animal Nutrition, Laboratory Course.** First term. Credit two or three hours. Must be preceded or accompanied by course 110. Registration by permission. M W F 1.40–4. Animal Nutrition Laboratory, Dairy Building. Assistant Professor MCCAY.

This course is designed to familiarize the student with the application of chemical methods to the solution of fundamental problems of nutrition. Laboratory fee, $5; breakage deposit, $5.

210. **Special Topics in Animal Nutrition and Physiology.** First and second terms. Credit one hour. Open to graduate students only. Registration by appointment. Assigned readings on selected topics, with weekly conferences. Time to be arranged. Professor MAYNARD and Assistant Professors ASDELL and MCCAY.

A consideration of the experimental data on which the principles of animal nutrition are based, and a critical review of current literature.

20. **Animal Breeding.** First term. Credit three hours. Prerequisite, course 1. Lectures, M W 9. Recitation, demonstration, or laboratory, T 1.40–4. Animal Husbandry Building B and Animal Breeding Laboratory. Assistant Professor HINMAN and Mr. METZGER.

A general outline of the principles of heredity as applied to the breeding of farm animals. Origin and formation of breeds. Elementary genetics. Laboratory fee, $2.

120. **Problems in Animal Genetics.** First term. Credit three hours. Prerequisite, course 20 or Plant Breeding 1. Lectures, T Th 11. Recitation period by appointment. Animal Husbandry Building. Professor HARPER.

Lectures, conferences, and reports, including statistical methods as applied to breeding animals. The work will consists largely of practice in making reports on statistical problems.

125. **Physiology of Reproduction.** Second term. Credit one hour. Registration by permission. M 10. Animal Husbandry Building B. Assistant Professor ASDELL.

A course in the physiology of the process of reproduction, chiefly in mammals, and of the related internal secretions.

30. **Health and Diseases of Animals.** First term. Credit three hours. Not open to freshmen or to those who have had no courses in animal husbandry. Lectures, M W F 11. Veterinary College. Professor BIRCH.

The course is designed to give the student a clear conception of the causes and nature of the diseases of animals, with suggestions for their prevention. Special attention is given to the methods of preventing the spread of the infectious and epizootic diseases. Such information as is practicable is given for the treatment of slight injuries and for first aid in emergencies.

40. **The Horse.** Second term. Credit three hours. Not open to freshmen. Lectures, T Th 11. Animal Husbandry Building A. Practice, W 1.40–4. Judging Pavilion. Professor HARPER.

A general course treating of the horse and the mule. Judging, scoring, care and management, economy in feeding, breeding, and stable management, including harnessing, hitching, and the like. Origin, history, and development of the breeds of horses. Laboratory fee, $2.

45. **Horseshoeing.** Second term. Credit one hour. Limited to thirty seniors. W 2–4 or Th 10–12. Farriery, Veterinary College. Professor ASMUS.

50. **Dairy Cattle.** Second term. Credit three hours. Prerequisite, course 1. Lectures, T Th 10. Animal Husbandry Building A. Practice, M or Th 1.40–4. Animal Husbandry Building A and Judging Pavilion. Professor SAVAGE, Dr. HARRISON, and Messrs. CRAWFORD and WORK.

Origin, history, and development of the breeds of dairy cattle; methods of breeding; economy of feeding; production of milk; care, management, and sanitation of the dairy herd. Practice in judging, scoring, tracing pedigrees, and keeping records. Laboratory fee, $2.

51. **Advanced Judging, Dairy Cattle.** Second term. Credit one hour. Prerequisite, course 50. Saturdays after Easter recess. One two-day trip is required. Hours by appointment. Successful students may also register for one hour in the succeeding fall term. Professor SAVAGE and Dr. HARRISON.

60. **Beef Cattle.** Second term. Credit three hours. Prerequisite, course 1. Lectures, W F 9. Animal Husbandry Building B. Practice, F 1.40–4. Judging Pavilion. Assistant Professor HINMAN and Mr. METZGER.

Origin, history, and development of the breeds of beef cattle; herd management; feeding for fattening; practice in judging. Lectures, recitations, discussions, reports, tracing of pedigrees, and field trips intended to give the student a knowledge of the management, production, and marketing of beef cattle. Estimated cost of trips, $12. Laboratory fee, $2.

70. **Swine.** Second term. Credit three hours. Not open to freshmen. Lectures, W F 10. Animal Husbandry Building B. Practice, T 1.40–4. Judging Pavilion. Mr. J. P. WILLMAN.

Origin, history, and development of the breeds of swine; herd management; practice in judging swine; and reports on assigned topics. Lectures, recitations, discussions, and field trips intended to give the student a knowledge of the feeding, management, production, and marketing of swine. Estimated cost of trips, $6. Laboratory fee, $2.

80. **Sheep.** First term. Credit three hours. Not open to freshmen. Lectures, T Th 10. Animal Husbandry Building B. Practice, M 1.40–4. Judging Pavilion. Mr. J. P. WILLMAN.

Origin, history, and development of the breeds of sheep; flock management; feeding and fattening lambs; practice in judging. Lectures, recitations, discussions, reports, and field trips intended to give the student a knowledge of the management, production, and marketing of sheep and lambs. Estimated cost of trips, $5. Laboratory fee, $2.

90. **Meat and Meat Products.** First or second term. Credit three hours. Not open to freshmen. Lecture, M 8. Animal Husbandry Building B. Two laboratory periods a week, W 1.40–4 and a choice of M T or F 1.40–4. Animal Husbandry Building B and Meat Laboratory. One required inspection trip to Buffalo stockyards and slaughterhouses. Mr. SCHUTT.

A course in the slaughtering of farm animals, the cutting of carcasses, and the preparation and curing of meats. Laboratory fee, $2.

91. **Meat and Meat Products.** First or second term. Open to students in Hotel Administration only. Credit two hours. Lecture, M 8. Animal Husbandry Building B. Laboratory period, M 1.40–4, T 1.40–4, or F 1.40–4. Animal Husbandry Building B and Meat Laboratory. One required trip as in course 90. Mr. SCHUTT.

A course in wholesale and retail buying, cutting, curing, and preparation of meats. Laboratory fee, $2.

92. **Meat and Meat Products.** First or second term. Open especially to the students of the College of Home Economics. Credit one hour. Laboratory and lecture period, Th 1.40–4. Animal Husbandry Building B and Meat Laboratory. Mr. SCHUTT.

A course in wholesale and retail buying, cutting, curing, and preparation of meats. Laboratory fee, $2.

200. **Research.** First and second terms. For advanced students only. Credit and hours by arrangement. Professors MORRISON, HARPER, MAYNARD, and SAVAGE, and Assistant Professors ASDELL, HINMAN, and MCCAY.

201. **Seminary.** First and second terms. Required of all graduate students taking either a major or a minor subject in the department. Advanced undergraduates will be admitted by permission, and, if a satisfactory report on an approved subject is presented, may receive not to exceed two hours credit. M 11. Professor MORRISON and departmental staff.

BACTERIOLOGY

1. **General Bacteriology.** First term. Credit six hours. Prerequisite, Chemistry 101. Lectures, recitations, and laboratory practice, M W F 1.40–5. Dairy Building 119 and 301. Assistant Professor STARK and Mrs. STARK.

An introductory course; a general survey of the field of bacteriology, with the fundamentals essential to further work in the subject. Laboratory fee, $10.

2. **Elementary Bacteriology.** Second term. Credit three hours. Prerequisite, Chemistry 101. Open only to students in the College of Home Economics. Lec-

tures, recitations, and laboratory practice, T Th 8–11 or 1.40–4.30. Dairy Building 119 and 301. Assistant Professor STARK and Mrs. STARK.

A general elementary course adapted to the needs of students in Home Economics. Laboratory fee, $10.

3. **Agricultural Bacteriology.** Second term. Credit three hours. Prerequisite, Chemistry 101. Not accepted as a prerequisite for advanced courses. Lectures, M W F 9. Dairy Building 119. Professor SHERMAN.

The elements of bacteriology, with a survey of the relation of microorganisms to agriculture.

105. **Higher Bacteria and Related Microorganisms.** First term. Credit three hours. Prerequisite, course 1. Lectures, recitations, and laboratory practice, T Th 1.40–4.30. Dairy Building 119 and 323. Assistant Professor KNAYSI.

A study of the higher bacteria, together with the yeasts and molds, that are of especial importance to the bacteriologist. Laboratory fee, $10.

106. **Dairy Bacteriology.** Second term. Credit four hours. Prerequisite, course 1. Lectures, recitations, and laboratory practice, M W 1.40–5. Dairy Building 119 and 323. Professor SHERMAN and Assistant Professor KNAYSI.

An advanced course for students in bacteriology or dairy industry. The relation of microorganisms to milk and milk products. The subject is treated from the standpoint of economic dairy bacteriology and also from the standpoint of milk hygiene and sanitary control. Laboratory fee, $10.

107. **Soil Bacteriology.** (Same as Agronomy 107.) Second term. Credit three hours. Prerequisite, course 1, Agronomy 1, and Chemistry 210 and 225. Lecture, W 8. Caldwell 143. Laboratory, W F 1.40–4. Caldwell 201. Professor J. K. WILSON.

An advanced course in biological soil processes designed for students specializing in bacteriology or soil technology. The laboratory work is supplemented by reports and by abstracts of important papers on the subject. Laboratory fee, $5.

Pathogenic Bacteriology. (See the Announcement of the New York State Veterinary College.)

210. **Physiology of Bacteria.** Second term. Credit two hours. Prerequisite, course 1 and at least one additional course in bacteriology. Lectures, M W 8. Dairy Building 120. Professor RAHN.

An advanced course in the physiology of bacteria and the biochemistry o microbic processes.

210a. **Physiology of Bacteria, Laboratory.** Second term. Credit two hours. Must be preceded or accompanied by course 210. Time to be arranged. Dairy Building. Professor RAHN and Mr. WOERZ.

An advanced laboratory course dealing with the biological principles of growth, fermentation, and death of bacteria. Laboratory fee, $10.

[211. **Taxonomy of Bacteria.** Second term. Credit two hours. Prerequisite, course 1 and at least one additional course in bacteriology. Professor RAHN.] Not given in 1931–32.

An advanced course dealing with the natural groups and variability of bacteria, with a study of the systems of nomemclature and classification.

212. **Bacteriological Literature.** Throughout the year. Credit one hour a term. For seniors and graduate students. F 8. Dairy Building 120. Professor RAHN.

Presentation and discussion of current literature in bacteriology.

213. **Morphology and Cytology of Bacteria.** First term. Credit one hour. For seniors and graduate students. Lecture, S 8. Dairy Building 119. Assistant Professor KNAYSI.

The morphology, cytology, and microchemistry of microorganisms.

220. **Research.** First or second term. Credit one or more hours, by arrangement. For advanced students.

Special problems in any phase of bacteriology may be elected. Laboratory fee, $2 for each credit hour.

221. **Seminary.** Throughout the year. Without credit. Required of graduate students specializing in the department; open to undergraduate students taking advanced work. Hours to be arranged. Dairy Building. Professor SHERMAN.

BOTANY

Students wishing instruction in special groups of plants or in special subjects should consult the department.

1. **General Botany.** Throughout the year. Credit three hours a term; except by permission of the department, both terms must be completed to obtain credit. Lectures, T Th 9 or 11. Plant Science 233. Laboratory, one period of two and one-half hours. Plant Science 240, 242, 262. Professor PETRY, Messrs. LAUBENGAYER, THOMAS, SCHAPPELLE, and LINDSEY, Miss CREIGHTON, and others.

A survey of the fundamental facts and principles of plant life. The work of the first term deals with the structures and functions of the higher plants, with special emphasis on nutrition. The work of the second term traces the evolution of the plant kingdom, as illustrated by representatives of the principal groups, and concludes with a brief introduction to the principles of classification of the flowering plants. Laboratory fee, $3.50 a term.

3. **Poisonous Plants.** Second term. Credit two hours. Lecture, T 10. Plant Science 141. Laboratory: section 1, W 8–10; section 2, T 1.40–4; section 3, T 8–10. Plant Science 353. Assistant Professor MUENSCHER and Mrs. CRAIG.

This course is designed primarily for veterinary students. Special emphasis is placed on the identification, poisonous properties, and distribution of stock-poisoning plants. Laboratory fee, $2.

13. **Trees and Shrubs.** First term. Credit three hours. Prerequisite, course 1 or its equivalent. Lecture, T 8. Plant Science 143. Laboratory or field work, M W or T Th 1.40–4. One all-day field trip is required. Plant Science 211. Professor WIEGAND and Mr. MAGUIRE.

The identification of trees and shrubs in summer and in winter conditions. The laboratory work covering identification is done largely in the field. The work of the latter part of the term is a study of the taxonomy of woody plants. For all students wishing a detailed knowledge of trees and shrubs. Laboratory fee, $3; deposit, $5.

[15. **Weed Identification and Control, Seed Analysis.** First term. Credit three hours. Prerequisite, course 1 or its equivalent. Assistant Professor MUENSCHER and Mrs. CRAIG.] Not given in 1931–32.

Designed primarily for students of agriculture, especially those preparing for work in agricultural extension, crop production, and farm management; adapted also for students of nature study, civic improvement, conservation of game birds, and related fields.

A study of the characteristics of weeds, their sources, methods of reproduction, dissemination, and migration. Consideration of the losses due to weeds, and of control. Practice in making purity tests in analyses of seeds. Laboratory fee, $3; deposit, $5.

117. **Taxonomy of the Higher Plants.** Second term. Credit four hours. Prerequisite, course 1 or its equivalent. Lecture, M 9. Laboratory, M W F 1.40–4. Plant Science 211. Professor WIEGAND and Mr. MAGUIRE.

A study of the kinds of seed plants and ferns, their classification into genera, families, and orders, and field work on the local flora. Emphasis placed on wild plants, but the more commonly cultivated varieties receive some attention. Preparation of a herbarium and of keys. The course is planned to follow course 1 and to furnish an introduction to the knowledge of field botany and classification of the higher plants, in preparation for special work in various departments, and as an aid in teaching. Laboratory fee, $4; deposit, $5.

Students completing this course may arrange, under course 145, to pursue special advanced work in taxonomy.

219. **Advanced Taxonomy of Vascular Plants.** Second term. Credit two hours. Prerequisite, course 117 or its equivalent. Hours to be arranged. Plant Science 211. Professor WIEGAND.

Special round-table discussion of topics of particular interest to the taxonomist. One hour is devoted to practical work on some group of plants.

22. **Microscopic Wood Structure.** Second term. Credit one hour. Prerequisite, courses 1 and 13 or their equivalents. Laboratory, W Th 1.40–4, first half of term. Lectures are given during the laboratory periods. Plant Science 228. Professor EAMES and Dr. JACKSON.

This course aims to familiarize students of wood technology and general forestry with the microscopic anatomy of wood. Identification of commercially important woods; a study of wood structures as related to uses, and as affecting impregnation with preservatives and other chemicals. Laboratory fee, $2.

123. **Plant Anatomy.** First term. Credit four hours. Prerequisite, course 1 or its equivalent, and permission to register. Lecture or conference, T 9. Laboratory, T 10–12.30, Th S 9–11.30. Plant Science 228. Professor EAMES and Dr. JACKSON.

Primarily for students in applied fields of botany such as pathology, pomology, or genetics. Designed to give a working acquaintance with the internal morphology of vascular plants, with emphasis on practice in interpretation and determination of material. Course 126 gives a less detailed training in this subject. Laboratory fee, $5.

[124. **Cytology.** Second term. Credit four hours. Prerequisite, course 1 or Zoology 1 and preferably course 126. Professor L. W. SHARP.] Not given in 1931–32.

Intended for those who have had some biological training. The principal topics considered are protoplasm, cells and their components, nuclear and cell division, meiosis and fertilization, and the relation of these to the problems of development, reproduction, and heredity. Both plant and animal materials are used. Microtechnic is not included. Laboratory fee, $5.

125. **Microtechnic.** First term. Credit three hours. Prerequisite, permission to register. Hours to be arranged. Plant Science 219. Professors EAMES and L. W. SHARP.

A course for advanced students who require training in the preparation of plant materials for histological or cytological study. Laboratory fee, $10.

224. **Seminary in Cytology.** First term. M 11. Plant Science 404. Professor L. W. SHARP.

[126. **Morphology of Vascular Plants.** First term. Credit four hours. Prerequisite, course 1 or its equivalent. Professor EAMES and Dr. JACKSON.] Not given in 1931–32.

An advanced course in the comparative morphology, life history, and phylogeny of vascular plants. Laboratory fee, $5.

Comparative Morphology of Fungi. Given in the Department of Plant Pathology.

227. **Seminary in Morphology.** Throughout the year. Hours to be arranged. Professor EAMES.

31. **Plant Physiology.** First or second term. Credit four hours. Prerequisite, course 1. Lectures, T Th 10. Plant Science 143. Laboratory, T Th 1.40–4 or W F 1.40–4. Plant Science 227. Professor KNUDSON or Professor O. F. CURTIS, Assistant Professor HOPKINS, and Messrs. FLEISCHER and CLARK.

This course is designed to acquaint the student with the general principles of plant physiology and their application. The principal topics considered are water relations, photosynthesis, translocation, digestion, respiration, mineral nutrition, growth, and reproduction. Laboratory fee, $4; deposit, $3.

231. **Plant Physiology, Advanced Lecture Course.** Throughout the year. Credit three hours a term. Prerequisite, training in botany and chemistry, to be determined in each case by the department. Recommended for seniors and

graduate students. Lectures, M W F 10. Plant Science 143. Professors KNUDSON and O. F. CURTIS.

232. **Plant Physiology, Advanced Laboratory Course.** Throughout the year. Credit three hours a term. Prerequisite or parallel, course 231. Laboratory, M 1.40–4, S 8–12.30. Plant Science 241. Professors KNUDSON and O. F. CURTIS, and Assistant Professor HOPKINS. Laboratory fee each term, $10; breakage deposit, $5.

233. **Seminary in Plant Physiology.** Throughout the year. Required of graduate students taking work in the department. Conference, F 11. Plant Science 141,143. Professors KNUDSON and O. F. CURTIS, and Assistant Professor HOPKINS.

The presentation and discussion of current contributions to plant physiology; reports on the research problems of graduate students and members of the staff.

[141. **History of Botany.** Second term, without credit.] Not given in 1931–32. A course of lectures given by various members of the staff with the purpose of acquainting advanced students of botany with the historical development of their science.

145. **Special Problems in General Botany, Taxonomy, Histology, Cytology, and Physiology.** Throughout the year. Credit not less than two hours a term. By appointment. Professors WIEGAND, KNUDSON, EAMES, L. W. SHARP, O. F. CURTIS, and PETRY, and Assistant Professors MUENSCHER and HOPKINS.

Students engaged on special problems may register in this course. They must satisfy the instructor under whom the work is taken as to preparation for the problem chosen. The laboratory fee depends on the nature of the work and on the number of credit hours.

DAIRY INDUSTRY

Students intending to specialize in Dairy Industry are urged to elect qualitative and quantitative analysis, organic chemistry, and general bacteriology, in order that these courses may be completed by the end of the first term of the junior year.

1. **Introductory Dairy Science.** First or second term. Credit three hours. Prerequisite, Chemistry 101 and 105. Lectures, T Th 11. Dairy Building 218. Laboratory: first term, M 1.40–4.30 or S 9–12; second term, M or Th 1.40–4.30. Dairy Building 209. Professor TROY and Mr. HERRINGTON.

The scientific and practical aspects of milk and a survey of the dairy industry. Especial attention is given to the composition of milk and its physical and chemical properties, quantitative tests for fat and other constituents, and qualitative tests for preservatives and adulterants. Laboratory fee, $5.

2. **Dairy Testing and Inspection.** Second term. Credit three hours. Open only to students in the Veterinary College and non-degree students in Agriculture. Lecture and laboratory practice, S 8–1. Dairy Building 218. Professors Ross and GUTHRIE.

A special course in milk testing and dairy inspection adapted to the needs of students in veterinary science. Laboratory fee, $5.

101. **Analysis and Control of Dairy Products.** Second term. Credit three hours. Prerequisite, course 1 and Chemistry 101; should be preceded by Chemistry 210 and 225. Lecture and laboratory practice, T 1–6. Dairy Building 218. Professor TROY and Mr. HERRINGTON.

The application of chemical methods to commercial dairy practice; analysis by standard chemical and factory methods; standardization and composition control; tests for adulterants and preservatives. Laboratory fee, $5.

102. **Market Milk and Milk Inspection.** Second term. Credit three hours. Must be preceded or accompanied by course 1; should be preceded or accompanied by Bacteriology 1 or its equivalent. Lecture and laboratory practice, W 1–6. Dairy Building 218 and 146. Professor Ross and Assistant Professor AYRES.

Attention is given to the production and control of market milk, with special reference to its improvement; milk as food; shipping stations; transportation and sale; pasteurizing; standardizing; clarification; certified milk; milk laws; commercial buttermilk; methods of cooling; harvesting and storage of ice; duties of milk inspectors; apparatus and buildings. The practice includes visits to dairies in the vicinity of Ithaca. A required two-day inspection trip in the neighboring counties may be arranged. Laboratory fee, $5.

103. **Milk-Products Manufacturing.** First term. Credit five hours. Prerequisite, course 1. Lectures, recitations, and laboratory practice, T Th 1–6. Dairy Building 120. Professor GUTHRIE and Assistant Professor AYRES.

The principles and practice of making butter, cheese, and casein, including a study of the physical, chemical, and biological factors involved. Consideration is given also to commercial operations and dairy-plant management. Laboratory fee, $5.

104. **Milk-Products Manufacturing.** Second term. Credit five hours. Prerequisite, course 1; should be preceded or accompanied by course 101. Lectures, recitations, and laboratory practice, F 1–6, S 8–1. Dairy Building 120. Assistant Professor AYRES.

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved. Laboratory fee, $5.

105. **Dairy Chemistry.** First term. Credit two hours. Prerequisite, qualitative and quantitative analysis and organic chemistry. Lectures, M W 8. Dairy Building 119. Professor P. F. SHARP.

A consideration of milk and dairy products from the physio-chemical point of view.

Dairy Bacteriology. (See Bacteriology 106.)

106. **Milk Products.** First and second terms. Credit two hours a term. Must be preceded or accompanied by course 105. Lectures, T Th 8. Dairy Building 218. Professor P. F. SHARP.

An advanced consideration of the scientific and technical aspects of milk products.

201. **Research.** First or second term. Credit one or more hours, by arrangement. For advanced students.

Special problems in any line of dairy work may be elected. Laboratory fee, $2 for each credit hour.

202. **Seminary.** Throughout the year. Without credit. Required of graduate students taking work in the department; open to undergraduate students taking advanced work. Every other Monday, 5.30–8. Dairy Building. Professor SHERMAN.

DRAWING

1. **Mechanical Drawing.** First or second term. Credit three hours. Lectures during laboratory periods. Laboratory: section 1, W F 1.40–4, or section 2, Th 1.40–4 and S 10.30–12.50. Two additional practice periods to be arranged to suit the schedule of the student. Dairy Building, Fourth Floor. Work begins with the first laboratory period. Students must apply at the time of registration regarding materials required. Assistant Professor REYNA.

A course dealing with the principles and practices involved in the art of conveying information by graphical methods. The work includes use of instruments; lettering; orthographic projection involving plans, elevations, and sections; isometric drawing; and the practical applications of these principles to simple problems. This course may well be taken early by students interested in agricultural engineering. Laboratory fee, $2.

2. **Mechanical Drawing.** First term. Credit three hours. Open only to students in hotel administration and required of them. Lectures during laboratory periods. Laboratory, T 1.40–4 and S 8–10.20. Additional practice periods to be arranged to suit the schedule of the student. Dairy Building, Fourth Floor.

Work will begin with the first laboratory period. Students must apply at the time of registration regarding materials required. Assistant Professor REYNA.

Laboratory fee, $2.

5. **Mechanical Perspective Drawing.** First or second term. Credit two hours. Lectures during laboratory periods. Laboratory, T Th 11–12 and two two-hour practice periods by arrangement. Dairy Building, Fourth Floor. Assistant Professor REYNA.

A course in perspective representation by mechanical methods, embracing all the fundamentals necessary for practical application to architectural or shop problems.

11. **Free-Hand Drawing.** First and second terms. Credit from two to four hours a term. If the course is first entered upon in the second term, the registration must be for a minimum of three hours. Lectures during practice. Practice by appointment, daily 9–12.50 and 1.40–4, except W afternoon and S morning. East Roberts 371. Professor BAKER and Assistant Professor GARRETT.

An elementary course for the development of graphic expression applicable to scientific studies. Of special value to those who expect to enter the field of teaching, nature study, or biological research.

12. **Free-Hand Drawing, Advanced Course.** First and second terms. Credit from two to four hours. Prerequisite, four hours of course 11 or its equivalent. Lectures during practice. Practice same as course 11. East Roberts 371. Professor BAKER and Assistant Professor GARRETT.

13. **Pen-and-Ink Drawing.** First and second terms. Credit from two to four hours. Prerequisite, four hours of course 11 or its equivalent. Practice, same as course 11. East Roberts 371. Professor BAKER and Assistant Professor GARRETT.

14. **Water Color.** First and second terms. Credit from two to four hours. Prerequisite, four hours of course 11 or its equivalent. Practice, same as course 11. East Roberts 371. Professor BAKER and Assistant Professor GARRETT.

15. **Freehand Perspective.** First term. Prerequisite, at least three hours of course 11 and a course in mechanical drawing. Hours by appointment. Professor BAKER.

A course in appearance drawing from data, with special emphasis on representation of tree forms and foliage; intended primarily for landscape-nursery students.

ENTOMOLOGY AND LIMNOLOGY

BIOLOGY

1. **General Biology.** Throughout the year. Credit three hours a term. First term prerequisite to second. Not open to students who have had college courses in zoology and botany. Lectures, M W 9 or 11. Plant Science 233. One practice period a week. Roberts 302. Professor CLAASSEN, Mr. WOODRUFF, and assistants.

An elementary course designed to acquaint the general student with the main ideas of biology through selected practical studies of the phenomena on which biological principles are based. Laboratory fee, $3.50 a term.

7. **Biology of the Human Species.** First term. Credit one hour. Lectures, T Th 11. Goldwin Smith A. Not open to freshmen. Should preferably follow Biology 1 or its equivalent. Professor NEEDHAM.

A general and elementary account of the origin and development of man, of the evolution of the responsive life, of the effect upon population of the alteration of environment by the processes of civilization, and of the evolution of the social organism and of social control.

75. **Laboratory Methods in Animal Biology.** Second term. Credit three hours. Prerequisite, major work in biology. Professor CLAASSEN. F 10–12.30, 1.40–4, and one other lecture period by appointment. West Basement, Bailey.

For seniors and graduates whose major work is in biology and who expect to teach or to follow some phase of zoology as a profession. This course includes such subjects as laboratory equipment; collecting, preservation, and storage of

materials; rearing of cultures; modeling in wax; injection of blood vessels and embalming; chart making; and photography of animals including the preparation of lantern slides. Laboratory fee, $4.

General Entomology

Courses 12, 15, 21, 30a, and one term of 31 are required of all students who plan to take advanced work or to major in entomology. A reading knowledge of German and French also is essential for advanced work in this department. The following courses have no prerequisites: 1, 15, 21, 30b.

1. See Biology, course 1.

11. **The Ecology of Insects.** First term. Credit three hours. Alternates with course 71. Prerequisite, Biology 1 or Zoology 1, and Entomology 12. Lecture, Th 9. Roberts 392. Practical exercises, Th 1.40–4, and F 1.40–4 or S 8–10.30. Professor NEEDHAM and Mrs. KLOTS.

A general study of insects in relation to their environment. Activities of insects; the rôle insects play in different natural associations; the relations between structure, instinct, habitat; ways of living. Laboratory fee, $2.50.

12. **General Entomology.** First term. Credit three hours. Prerequisite, Biology 1, Zoology 1, or Botany 1. Lectures, W F 9. Roberts 392. Professor HERRICK. Practical exercises, T W Th or F 1.40–4, or S 8–10.30. Roberts 392. Professor HERRICK and Messrs. HORSFALL and BUTT.

Lectures on the characteristics of orders, suborders, and the more important families, and on the habits of representative species; practical exercises in studying the structure of insects and their classification. The lectures only (two hours) may be taken by those who have had courses 12, 21, and 30. Laboratory fee, $2.50.

15. **Wing Venation and Evolution.** First or second term. Credit one hour. Required of all students who plan to take advanced work in entomology. Open to freshmen. Lecture, T 12, Roberts 392, and two additional hours on T afternoon or T Th morning, by appointment, Roberts 301. Professor BRADLEY and Mr. PATE.

A laboratory study of evolutional series as illustrated by progressive modification of the wings of insects.

118. **The Technics of Biological Literature.** First term. Credit three hours. Lectures, M F 11. Roberts 392. Library work by assignment. Professor BRADLEY.

A critical study of the biologists' works of reference. Practice in the use of generic and specific indices and of bibliographies, and in the preparation of the latter; methods of preparing technical papers for publication. This course is of a technical nature, and is intended to aid students specializing in zoology or entomology in their contact with literature.

119. **Entomological Reading in Foreign Languages.** French first term, German second term. Two hours a week, by appointment. Without credit. Open to advanced students in entomology who have an elementary knowledge of the languages. Professor JOHANNSEN.

Insect Morphology

21. **Elementary Morphology of Insects.** First or second term. Credit three hours. Required of all students who plan to take advanced work in entomology. Hours by appointment. Roberts 391. Professor JOHANNSEN and Mr. SHAW.

This course deals with the external and the internal anatomy of several common species of insects. Laboratory fee, $2.

122. **Insect Morphology.** First and second terms. Credit two hours. Prerequisite, courses 21, and 12 or 30a. Lectures, assigned reading, and reports, T Th 10. Roberts 392. Professor JOHANNSEN.

This course deals with the anatomy, histology, embryology, and post-embryonic development of insects.

124. **Histology of Insects.** First or second term. Credit two hours. Must be preceded or accompanied by course 122. Laboratory, two periods a week, by appointment. Roberts 391. Professor JOHANNSEN.

Technic in histological methods as applied to insects. Laboratory fee, $3.

Insect Taxonomy

30a, 30b. Elementary Taxonomy of Insects. Second term. Courses 30a and 30b may be taken independently, credit one hour each. Open to freshmen. Laboratory and field work, W F 1.40–4. Roberts 301. Professor Bradley and Mr. Pate.

(30a) Until the spring recess: Practice in determining the orders and families of insects. Prerequisite, courses 15 and 21. (30b) After the spring recess: Methods of collecting insects and preserving them for study, and other matters of technic. No prerequisite. Laboratory fee, $2.25 for each credit hour.

31. **Taxonomy of Insects.** This course extends through three terms, but the work of any term may be taken independently. Credit three hours. Prerequisite, courses 21, 15, and 30a. Lecture, W 10. Roberts 392. Laboratory: first term, M W 1.40–4; second term, W F 1.40–4. Roberts 301. Professor Bradley, Dr. Forbes, and Mr. Pate.

A survey of the classification of the orders of insects. For the year 1931–32, the orders to be treated are: first term, Hymenoptera, Hemiptera; second term, Orthoptera, Diptera, minor orders. For the year 1932–33, the orders to be treated are: first term, Coleoptera, Lepidoptera. Laboratory fee, $4.50.

Economic Entomology

41. **General Economic Entomology.** Second term. Credit three hours. Prerequisite, course 12. Lectures, W F 9. Roberts 392. Professor Herrick. Practical exercises, W Th or F 1.40–4. Roberts 392. Professor Herrick and Messrs. Horsfall and Butt.

Lectures on the life histories and habits of injurious insects, and on methods of control; practical exercises on the commoner pests and the more important insecticides, as time permits; several field excursions. Laboratory fee, $2.

241. **Advanced Economic Entomology and Insectary Methods.** Second term. Credit three hours. Open only to qualified seniors and graduate students. Lecture, Th 11. Roberts 392. Seminary, Th 1.40–4. Field and laboratory work by appointment. Insectary. Professor Matheson.

Economic problems connected with applied entomology are discussed and reported on, and field observations are made. Experimental methods in breeding, photographing, investigating, and controlling insects are discussed and studied. Designed for advanced students in entomology who desire to fit themselves for experiment-station work. Laboratory fee, $2.50.

242. **Principles of Applied Entomology.** First and second terms. Credit two hours a term. For seniors and graduate students. Prerequisite, permission to register. Conferences, M F 2–4. West Basement, Bailey. Professor Claassen.

A conference course in problems of insect control, including research methods, planning and conducting experiments, and interpreting and presenting results. This course is given in cooperation with the entomological staff of the New York State Agricultural Experiment Station at Geneva, and the extension and research staffs of the Department of Entomology at Cornell University.

43. **Forest Insects.** Second term. Credit two hours. Prerequisite, first term of course 12. Lecture, Th 8. Laboratory, S 8–10.30. Roberts 392. Professor Herrick and Mr. Butt.

Consideration of the chief insects injurious to forests and farm woodlots and the methods of control. Laboratory fee, $1.50.

Parasitology and Medical Entomology

51. **Parasites and Parasitism.** First term. Credit two or three hours. Prerequisite, Biology 1 or Zoology 1. Lecture, T 9. Bailey Hall. Practical exercises, M or T 1.40–4, or T 10–12.30. Professor Matheson and Mr. ———.

A consideration of the origin and biological significance of parasitism, and of the structure, life, and economic relations of representative parasites. A limited number of well-prepared students will be permitted to take the extra hour's credit. The work occupies one afternoon each week and is devoted to the technic of the

diagnosis of parasitic infections, preparation of material from post-mortem examinations, and advanced work in parasitology. Laboratory fee, $2 or $4.

52. **Medical Entomology.** Second term. Credit two or three hours. Prerequisite, Zoology 1 or Biology 1. Lecture, T 9. Bailey Hall. Practical exercises, M or T 1.40–4, or T 10–12.30. Professor MATHESON and Mr. ———.

This course deals with insects and other arthropods that are the causative agents of disease in man and animals, or are the vectors, or intermediate hosts, of disease-producing organisms. A limited number of well-prepared students will be permitted to take the extra hour's credit. The work occupies one afternoon each week and consists of detailed studies of selected groups of insects in their relation to disease causation or as vectors of pathogenic organisms of animals. Laboratory fee, $2 or $4.

APICULTURE

Advanced and graduate students taking courses 122 and 124, and specializing in apiculture, are permitted to use the honeybee as illustrative material in the laboratory work of these courses.

[61. **General Beekeeping.** Second term. Credit three hours. Professor PHILLIPS.] Not given in 1931–32.

This course is intended to afford a general knowledge of the fundamentals of beekeeping, including the life history, instincts, and general behavior of bees, their products, the sources of honey, the rôle of bees in cross-pollination, the equipment of the apiary, wintering problems, the diseases of bees, and the rearing of queens. Laboratory fee, $2.50.

261. **Advanced Beekeeping.** First and second terms. Credit four hours a term. Open only to qualified seniors and graduate students. T Th 11–12.50. Dairy Building 154. Professor PHILLIPS.

A technical course covering investigations, especially those of a scientific character, in all phases of apiculture. Special consideration is given to the study of beekeeping regions, with particular reference to conditions in New York.

Designed for advanced students preparing to teach or to do research in apiculture.

[262. **Apicultural Literature and Its Technics.** First and second terms. Credit three hours a term. Open only to qualified seniors and graduate students. Prerequisite, a reading knowledge of either French or German. Professor PHILLIPS.] Not given in 1931–32.

This course is planned to acquaint the student with the current technical and practical literature of beekeeping, each student being assigned certain journals for the abstracting of all important papers which they contain. Practice in the use and preparation of bibliography and abstracts, and in the preparation of technical papers for publication. Designed only for advanced students in apiculture.

LIMNOLOGY

[71. **General Limnology.** Second term. Credit three hours. Alternates with course 11. Open to students who have taken or are taking courses 1 and 12, or the equivalent. Professor NEEDHAM and Mrs. KLOTS.] Not given in 1931–32.

An introduction to the study of the life of inland waters. Aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. The course includes one all-day trip, taken on a Saturday in May. Laboratory fee, $2.50.

[73. **Aquiculture.** First term. Credit three hours. Prerequisite, Biology 1 or Zoology 1. Professor EMBODY.] Not given in 1931–32.

An exposition of the basic principles and cultural methods for propagating useful aquatic organisms, with special reference to fishes. The lectures cover such subjects as migration, spawning habits, natural and artificial foods, growth, assessment of age; cultural procedure for trout, bass, and other American fishes; European carp culture; commercial propagation of goldfish; financial aspects of fish culture; and the work of governmental agencies in conserving our fishery resources.

[74. **Fish Culture.** Second term. Credit two or three hours. Must be preceded by course 73. Professor EMBODY.] Not given in 1931–32.

A laboratory and field course, designed to give practice in hatchery methods, pond management, the study of natural conditions suitable for the maintenance of fish life, the evaluation of streams and lakes, and stocking procedure. An all-day excursion to one of the state fish hatcheries is required. The expense for this trip should not exceed $10. Laboratory fee, $3 a credit hour.

RESEARCH

300. **Research.** Throughout the year. Credit and laboratory fees to be arranged. Prerequisite, permission to register from the professor under whom the work is to be taken. Roberts.

300a. **Insect Ecology and Limnology.** Professors NEEDHAM and CLAASSEN.

300b. **Insect Morphology.** Professor JOHANNSEN.

300c. **Taxonomy.** Professor BRADLEY and Dr. FORBES.

300d. **Economic Entomology.** Professors HERRICK, MATHESON, CROSBY, and CLAASSEN, and Assistant Professor MACLEOD.

300e. **Medical Entomology and Parasitology.** Professor MATHESON.

300f. **Apiculture.** Professor PHILLIPS.

300g. **Aquiculture.** Professor EMBODY.

300h. **Arachnology.** Professor CROSBY.

300i. **Insect Physiology.** Professors PHILLIPS and JOHANNSEN, and Assistant Professor MACLEOD.

SEMINARIES

Jugatae. Throughout the year. M 4.10–5. Roberts 392.

The work of an entomological seminary is conducted by the Jugatae, an entomological club that meets for a discussion of the results of investigations by its members.

Seminary in Insect Physiology. Throughout the year. M 6.30–8. Roberts 302. Open to qualified students. Assistant Professor MACLEOD.

EXTENSION TEACHING

101. **Oral and Written Expression.** First term. Credit two hours. Open to juniors and seniors. The number in each section is limited. Students should consult Assistant Professor PEABODY for assignment to sections. Lectures and practice, M F 11, W F 10, or T Th 11, Roberts 131; T Th 10, Roberts 292. Criticism, by appointment, daily, 8–1. Professors EVERETT and WHEELER, and Assistant Professor PEABODY.

Practice in oral and written presentation of topics in agriculture, with criticism and individual appointments on the technic of public speech. Designed to encourage interest in public affairs, and, through demonstrations and the use of graphic material and other forms, to train for effective self-expression in public. Special training is given to competitors for the Eastman Prizes for Public Speaking and the Farm Life Challenge contest. (See page 19.)

102. **Oral and Written Expression.** Second term. Credit two hours. Prerequisite, course 101, of which course 102 is a continuation. A part of the work of course 102 consists of a study of parliamentary practice. Lectures and practice, W F 10, T Th 9, T Th 10, or M F 11. Roberts 131. Criticism, by appointment, daily 8–1. Professors EVERETT and WHEELER, and Assistant Professor PEABODY.

103. **Extension Organization, Administration, and Policy.** Second term. Credit two hours. Open to graduate students and seniors, and to juniors by special arrangement. Lectures and written exercises based on field work. W F 10. Roberts 292. Professor WHEELER and Mr. SIMONS.

Designed to familiarize students with the organization, administration, and policies of extension work as exemplified in New York State. The course is for students preparing for effective service as citizens in rural communities, as well as for prospective county agents or other extension workers in agriculture and home economics. Personal visits to county farm- and home-bureau offices and commit-

teemen, to offices of leaders of county agents, and to college specialists, and attendance at several extension meetings, are required. Expenses of these visits may be kept within $5 or $10.

104. **Advanced Oral Expression.** First or second term. Credit two hours. Prerequisite, courses 101 and 102. Not given unless four or more register. M W 12. Roberts 292. Assistant Professor PEABODY.

An advanced course of study and practice in oral expression as directly related to the needs of the county agent, the home demonstration agent, the junior club leader, and the extension specialist. Part of the work consists in a study of and practice in radio speaking.

15. **Agricultural Journalism.** First term. Credit three hours. Open only to those who have passed the required hours in English with an average grade of C or better. T Th S 10. Fernow 210. Professor BRISTOW ADAMS.

This course gives the principles of news writing as applied to agricultural and home-economics subjects.

117. **Agricultural News Writing.** First and second terms. Credit upon completion of the course two hours a term. Prerequisite, course 15 or English 68. Th 2–4. Roberts 292. Professor BRISTOW ADAMS.

This course deals with practical news writing for publication. It includes criticisms, discussions, and consultations on published material written by students in the course.

119. **The Country Newspaper.** First term. Credit two hours. Prerequisite, course 15 and Rural Social Organization 1. M W 10. East Roberts 232. Professor BRISTOW ADAMS.

A study of the community newspaper, its problems, its make-up, and its place as an influence in rural life.

120. **Agricultural Information.** Second term. Credit two hours. Prerequisite, course 15. T Th 11. East Roberts 212. Professor BRISTOW ADAMS.

Publicity and advertising in agricultural extension.

122. **Special Feature Articles.** Second term. Credit two hours. Prerequisite, course 15. M W 10. East Roberts 232. Professor BRISTOW ADAMS.

FARM PRACTICE

The farm-practice requirement is forty points, all of which must be obtained by actual farm work. (See page 26.)

The Office of Farm Practice will assist students in getting work on farms during vacations and at other times, and will supervise and keep records of the work.

Students should consult the office in regard to work on farms.

The office will also be glad to assist those students who have completed the farm-practice requirement, in obtaining places on farms where they can gain wider experience.

1. **Farm Practice.** First and second terms. Without credit toward graduation, but giving credit toward the farm-practice requirement, depending on the amount and the quality of the work done. Hour and place, by appointment. Professor KING and assistants.

A course designed to assist those students who enter with little or no farm experience. Students will have an opportunity to hitch, harness, and drive horses, and to familiarize themselves with the use of the common farm tools. Admission to this course will be determined by the results of the farm-practice tests. This course should be taken by all new students who have had limited farm experience.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

Instruction in floriculture is planned for the following classes of students: (1) those who intend to make some branch of commercial flower-growing their life work; (2) those who plan to enter a retail business in floriculture; (3) those who are interested in amateur flower-growing for pleasure and home decoration; (4) those who plan to take up some line of work on private estates or in city parks. Courses

121 and 122 should not be elected until courses in botany, soils, plant physiology, plant pathology, plant breeding, and economic entomology have laid a foundation on which to build the scientific principles of commercial flower-growing.

Instruction in ornamental horticulture is planned primarily to fit students for nursery management and for nursery landscape service. The former deals with the propagation, growing, and selling of ornamental plants, while the latter deals with the proper planning and planting of small properties.

All students specializing in floriculture or ornamental horticulture must take one spring and summer, or its equivalent, in actual practice in the field or in greenhouses. In the nursery-management course this practice period comes in the second year, spring and summer. In the nursery-landscape course it comes in the third year, spring and summer.

All students specializing in ornamental horticulture should report promptly to the department to obtain the latest schedule of courses required.

1. **Woody-Plant Propagation.** First term. Credit four hours. Prerequisite, Botany 1 or departmental permission in special cases. Lectures, W 10, F 12. Practice, T 11–12.50, S 10.30–12.50. Greenhouses and nurseries. Assistant Professor HUNN and Mr. SKINNER.

This course is planned for both the general students and those specializing in floriculture and ornamental horticulture. It consists of a study of the elementary methods of woody-plant propagation, and the care of the plant stocks produced. All members of the class are required to participate in an excursion to nurseries in Newark or vicinity early in November. Laboratory fee, $4.

1a. **Woody-Plant Propagation, Laboratory Course.** First or second term. Credit one hour. Prerequisite, course 1 or permission to register. M S 9–11. Greenhouses and nurseries. Mr. SKINNER.

This course continues the laboratory work begun in course 1, and includes the handling and rearing of ornamental plants to suitable size for nursery planting. Laboratory fee, $1.

2. **Advanced Woody-Plant Propagation, and Commercial Practices.** First and second terms. Credit two hours. Prerequisite, course 1 and Chemistry 101; to be accompanied or preceded by Plant Physiology 31. Laboratory, M W 11–12.50. Greenhouses and nurseries. Assistant Professor HUNN and Mr. SKINNER.

A study of commercial-propagation problems and the use of greenhouses, frames, and seedbeds. The course further emphasizes the care of woody-plant stocks in the lining-out nursery and as a sales enterprise. Students are required to participate in an excursion to Newark, New York, in November, and in an Easter trip to Long Island and New Jersey nurseries. Laboratory fee, $5.

3. **Principles and Methods of Nursery Practice.** First and second terms. Credit two hours. Prerequisite, course 2 and Agronomy 1. Must be preceded or accompanied by Farm Management 102. Laboratory, T 1.40–4, F 9–11. Greenhouses and nurseries. Assistant Professor HUNN.

A course designed to meet the needs of students who intend to specialize in the commercial growing of ornamental nursery plants. It takes up nursery lands, the cultural care of nursery plants, and the practices employed in placing this material in the hands of the consumer. Special consideration is given to the economics of the industry, the sales, nursery organizations, and the relation of the nursery business to landscaping enterprises.

Several trips of a day's duration are made to nurseries in western New York in the fall term. A trip to the annual winter meeting of the New York State Nurserymen's Association at Rochester, and an extended trip to the vicinity of Philadelphia, Pennsylvania, or to Painesville, Ohio, during the Easter vacation, are made. Laboratory fee, $4.

5. **Amateur Floriculture.** First or second term. Credit three hours. Lectures, M W 11. Cannot be taken for credit by those who have had course 11. Registration limited to fifteen students. Plant Science 37. Practice, Th 1.40–4. Plant Science 15 and greenhouses. Miss MINNS.

The culture, in the home, of potted plants suitable for window gardening and for outdoor home gardening is considered. The course includes a study of con-

tainers, soils, fertilizers, and insecticides; also the preparation and planting of flower beds. It is planned primarily for students in home economics, but is open to any one desiring information regarding simple methods of plant culture. Laboratory fee, $2.

6. **Garden Flowers.** Second term. Credit three hours. Prerequisite, course 5 or 11. Lectures, T Th 8. Registration limited to fifteen students. Plant Science 37. Lectures, discussions, and practice, F 1.40–4. Plant Science 15, greenhouses, and gardens. Miss MINNS.

A study of the identification and culture of annuals, herbaceous perennials, and garden roses. The aim is to give the student an intimate knowledge of those forms of annual and herbaceous plants that may be used in garden planting, either on home grounds or in public parks. An excellent collection of plant material is available for demonstration work in this course. All members of the class are required to participate in an excursion to the Thompson estate at Canandaigua, on May 27. Laboratory fee, $2.

8. **Woody-Plant Materials.** Second and first terms. Inclusion of the summer school is not required but is strongly advised. Credit three hours a term. For advanced and graduate students. Lecture, F 12. Laboratory and field trips, M W 1.40–4. Plant Science 29. Professor R. W. CURTIS and Mr. WYMAN.

A study of the trees, shrubs, and vines used in landscape planting and in nursery work. All members of the class are required to participate in two excursions to the Rochester parks, one in the spring and one in the fall. The transportation and one meal charge for each trip will be approximately $6. Laboratory fee, $4.

11. **Principles and Methods of the Propagation and Management of Greenhouse Crops.** First term. Credit four hours. Prerequisite to courses 6, 121, 122, and 125. Lectures, M W F 9. Plant Science 37. Practice, T 1.40–4. Plant Science 15 and greenhouses. Professor WHITE and Mr. POST.

An elementary course in commercial flower growing, intended to acquaint students with the scientific principles and floricultural methods governing the propagation and culture of flowers under glass. The construction, heating, and equipment of greenhouses also is studied. Laboratory fee, $2.50.

121. **Commercial Floriculture.** First term. Credit four hours. Prerequisite, course 11, Botany 1, Agronomy 1, and the practice requirement. No student will be admitted to the course who has not had at least a half year of practical experience in a greenhouse. Lectures and recitations, M W F 10. Plant Science 37. Practice, F 1.40–4. Greenhouses. Mr. POST.

Studies in the culture of commercial florists' crops. Methods of packing, shipping, and marketing are considered. The class is required to participate in an excursion to Utica and Rome on October 14. Laboratory fee, $2.

122. **Commercial Floriculture.** Second term. Credit four hours. Prerequisite, course 121. Lectures and recitations, M W F 10. Plant Science 37. Practice, F 1.40–4. Greenhouses. Mr. POST.

A continuation of course 121, with methods of culture of commercial crops not previously considered. Students taking these courses are expected to work on commercial ranges during one semester and vacations. The class is required to participate in an excursion to Rochester on March 18. Laboratory fee, $2.

123. **Wholesaling and Retailing Flowers.** Second term. Credit three hours. Prerequisite, courses 121 and 122, and permission to register. Lectures, T Th 9. Plant Science 37. Practice, W 1.40–4. Plant Science 22. Mr. POST.

This course is planned with the view of giving students a thorough knowledge of methods of retail-store management, store equipment, salesmanship, business methods, delivery, decorating for all functions, flower arrangement and the making of designs, methods of conducting cooperative flower exchanges, and wholesale markets. Other topics of a like nature are discussed. A required trip to Rochester to visit a wholesale establishment and retail stores, is made on May 4. Laboratory fee, $5.

125. **Conservatory Plants.** First term. Credit three hours. Prerequisite, course 11 and Botany 1. Lectures, T Th 11. Plant Science 37. Laboratory, W 1.40–4. Plant Science 15. Mr. POST.

Designed for students interested in work on private estates or in parks. A study of such tropical and subtropical foliage and flowering plants as are used for the ornamentation of glasshouses of decorative type. Laboratory fee, $1.

31. **Flower Arrangement.** Second term. Credit one hour. Registration limited to fifteen students in each section. Preference for registration in Section I is given to students specializing in floriculture or in agriculture. Section II is for home-economics students. Lectures, demonstrations, and practice: Section I, T 1.40–4; Section II, Th 1.40–4. Plant Science 22. Professor WHITE.

A study of the principles and methods of arrangement of flowers for home decoration and table decoration, in baskets, vases, and formal designs; also the arrangement of flowers and plants for all types of interior decoration. Laboratory fee, $5.

51. **Lawn-making and Green-keeping.** Second term. Credit two hours. S 8–1. Plant Science 29. Professor R. W. CURTIS.

This course deals with the principles, practices, and materials which have to do with the construction and maintenance of lawns and greens. It is a survey course, and includes a term report assigned to each student. Two inspection trips are taken late in the spring, first to the Arlington Turf Garden near Washington, D. C. and to golf courses at Philadelphia, Pennsylvania, and then to Utica, New York.

61a. **Landscape Work on Small Properties.** Second term. Credit four hours. Intended for advanced students; not open for general election. Prerequisite, courses 6 and 8, and Drawing 11. Lectures, W F 10. Laboratory, T F 1.40–4. Plant Science 433. Acting Professor PORTER and Mr. DEFRANCE.

A study of arrangement, construction, and planting of small properties. Laboratory fee, $2.50.

61b. **Landscape Work on Small Properties, Advanced Course.** First term. Credit four hours. Prerequisite, course 61a. Laboratory, T 1.40–4 and three other periods at the convenience of the student. Plant Science 433. Acting Professor PORTER and Mr. DEFRANCE.

A continuation of course 61a. Laboratory fee, $2.50.

62a. **Plant Design.** Second term. Credit two hours. Prerequisite, courses 6 and 8, and Drawing 11. Lecture, T 11. Laboratory, Th 10–12.50. Plant Science 433. Acting Professor PORTER and Mr. DEFRANCE.

A study of the nature and characteristics of woody-plant materials in their relation to planting arrangements. The grouping of plants to produce serviceable as well as beautiful designs and compositions. A study of form, color, texture, and habit. Laboratory fee, $2.

62b. **Plant Design, Advanced Course.** First term. Credit three hours. Prerequisite, course 62a. Lecture, Th 8. Laboratory, Th 9–12, and an additional drafting period at the convenience of the student. Plant Science 433. Acting Professor PORTER and Mr. DEFRANCE.

A continuation of course 62a. Laboratory fee, $2.

63. **Construction of Small Gardens.** First term. Credit two hours. Intended for advanced students in ornamental horticulture. Prerequisite, courses 61a, 61b, 62a, and 62b. Lecture, T 9. Laboratory, W 1.40–4. Plant Science 433. Acting Professor PORTER.

A study of the design and construction of intimate garden areas, their styles and types. Laboratory fee, $1.50.

64. **Color Schemes and the Arrangement of Garden Materials.** Second term. Credit two hours. Prerequisite, course 63. Lecture, W 11. Laboratory, M 1.40–4. Plant Science 433. Acting Professor PORTER.

A study of plant and flower combinations. Arrangement in groups and borders relative to color schemes, harmonies, and periods of bloom, and for special effects. Laboratory fee, $1.50.

162. **Special Problems in Floriculture and Ornamental Horticulture.** Throughout the year. Credit to be arranged. Designed for upperclassmen and graduate students. Prerequisite, permission to register. Consultation by appointment. Professors WHITE and R. W. CURTIS, Acting Professor PORTER, and Assistant Professor HUNN.

The investigations of problems in materials for ornamental planting, and in the commercial culture of cut flowers and potted plants, exotics, gardens flowers, and the like.

201. **Seminary.** First term. Credit one hour. Required of advanced students who elect course 162, and of all graduate students in the department. S 9. Plant Science Seminar Room.

FORESTRY

The instruction in forestry is designed to meet the needs of several classes of students: (1) professional forestry students preparing for forestry as a life work (course outlined below); (2) students of general agriculture who wish elementary instruction in the care of woodlands and in forest planting and forest nursery work; (3) prospective teachers, business and professional men, and others who desire an understanding of the place of forestry in the life of a nation; (4) technical students in other lines who wish one or more technical forestry courses, such as wood technology. The entrance requirements are the same as for general agriculture. The four-years undergraduate curriculum leads to the degree of bachelor of science.

During the four years the professional forestry student is registered in the College of Agriculture, his work must include: (a) all the courses required of general agricultural students; (b) plane trigonometry, unless accepted for entrance; (c) such other work as the Department of Forestry believes to be best adapted to meet the needs of the individual student; (d) at least four months of experience in forestry work or in a forest industry, one month of which, in the summer following the junior year, must be spent in the forestry camp conducted by the Department of Forestry in a forest in New York State; (e) Civil Engineering summer camp, of four weeks. Requirement (d) is demanded of all professional forestry students, both as a part of their training and also in lieu of the farm-practice requirement, and must be completed before registration day of the senior year. A two-weeks trip to the South in connection with course 143 is available to seniors during the spring recess, and three days immediately before and after; for this two-weeks credit will be allowed on the practice requirement. On the following pages is a required sequence of studies for students specializing in forestry. Deviations from this sequence may be made only with the approval of the student's faculty adviser. In all cases the course of study for a professional forestry student must be planned by the Department of Forestry; and each professional forestry student must choose as his faculty adviser one of the professors or assistant professors in the Department of Forestry. Professional forestry students must register with the department in order that their standing as such may be recognized.

Further details regarding the professional forestry course may be obtained through correspondence with the Department of Forestry. Freshmen who are planning to take the professional forestry course should enter the College at the beginning of the first term of the college year. Those entering in the second term will have difficulty in arranging satisfactory schedules of courses, and may require one extra term to complete all the requirements.

Required Sequence of Studies for Professional Students in Forestry

Professional students in forestry must complete satisfactorily all of the courses listed in the following curriculum.

Freshman year

First term	*Hours*	*Second term*	*Hours*
Freshman Orientation Course	1	English 1	3
English 1	3	Botany 1	3
Chemistry 101	3	Geology 100	3
Chemistry 105	3	Drawing 1	3
Botany 1	3	Forestry 3	2
Mathematics 3*	3	Forestry 5	2
Hygiene 1	1	Hygiene 2	1

Summer following freshman year

Period of required field experience, thirteen weeks

Sophomore year†

First term	*Hours*	*Second term*	*Hours*
Civil Engineering 110 (Elementary Surveying)	3	Physics 4‡	3
Botany 13	3	Botany 31	4
Entomology 12	3	Civil Engineering 211a (Advanced Surveying)	3
Economics 1	5	Entomology 43	2
Physics 3‡	3	Forestry 151	3
Elective		Elective	

Summer following sophomore year

C. E. summer camp, four weeks. Civil Engineering 213 (Surveying) Credit four hours

Junior year

First term	*Hours*	*Second term*	*Hours*
Forestry 121	4	Botany 22	1
Plant Pathology 1	3	Forestry 140	2
Agronomy 2	3	Forestry 141	2
Forestry 152	2	Forestry 123	3
Forestry 124	3	Forestry 153	3
		Plant Pathology 111	2
		Civil Engineering 214	2

Summer following junior year

Department of Forestry summer camp, four weeks, August and September. Professional forestry students must attend this camp to satisfy in part the requirement for forest practice demanded of forestry students in lieu of farm practice.

Senior year

Schedules of seniors must be arranged so that Tuesday of each week, first term, will be left free for field work, 8–4, in connection with courses 125, 142, and 156.

First term	*Hours*	*Second term*	*Hours*
Forestry 142	3	Forestry 143	2
Forestry 144	2	Forestry 154	2
Forestry 125	3	Forestry 131	3
Forestry 111	3	Forestry 112	2
Forestry 155	3	Elective	
Forestry 156	1–3		

Graduate year

The undergraduate professional curriculum of the Department of Forestry lays the foundation for the practice of professional forestry. For many types of forestry work, a year or more of graduate study is desirable. In the Graduate School of Cornell University, opportunity is offered for graduate study in the five main branches of forestry—forest protection, silviculture, forest management, forest utilization, and forest policy—as well as in the closely related fields of plant physiology, genetics, forest pathology, forest entomology, and forest soils. The degree of master in forestry is conferred upon the satisfactory completion of one year of graduate work. Two additional years of study are required for the doctorate. (See the Announcement of the Graduate School.)

*Mathematics 3 (Plane Trigonometry) must be taken during the freshman year if this subject was not offered for entrance.

†Students planning to elect Chemistry 776 (Chemistry of Pulp and Paper Making) should elect the prerequisite thereto, Chemistry 775 (Engineering Chemistry), during the second term of the sophomore year.

‡Required of students who do not present physics for entrance. Other students may elect Agronomy 2 in place of this subject.

General Forestry

Courses 1, 24, and 53 are designed for agricultural students to found them in woodland management, and are of special interest for those who are planning to enter agricultural-extension work or to prepare for the position of county agricultural agent.

1. **The Farm Woodlot.** First term. Credit two hours. Lecture, Th 9. Practice, M 1.40–4. Fernow 122. Assistant Professor Guise.

A course covering those phases of forestry that are applicable to the farm woodlot. Identification of the principal trees of this region; measurement of logs, trees, and stands; nursery work, forest plantings, thinnings, and improvement cuttings; the preservative treatment of farm timbers. Laboratory fee, $1.

Students expecting to take courses 53 and 24 should not elect course 1, since the ground covered in course 1 is repeated in courses 53 and 24.

3. **Conservation of Natural Resources.** Second term. Credit two hours. For others than professional forestry students. Prerequisite, Economics 1. Lectures, T Th 10. Fernow 122. Professor Bristow Adams.

The conservation of natural resources in the United States; the interrelation of the uses and wastes of the forest with those of various resources; the influence of the physical equipment of America on human life and on American civilization, with special reference to natural resources, as the basis of national strength.

4. **The Field of Forestry.** First term. Credit two hours. Lectures, M W 10. Fernow 122. Professor Hosmer.

The place of forestry in the life of a nation; its nature, aims, and economic importance; the five main branches of forestry; national, state, communal, and private forestry.

5. **Introduction to Forestry.** Second term. Credit two hours. Required of first-year professional forestry students, and open only by special permission to others intending to specialize in forestry. Lectures, M W 10 until spring recess. Fernow 122. After spring recess, lecture, W 10, field work, S 8–10.30. Professor Spring and other members of the forestry staff.

An introductory course intended to acquaint the student with the forestry profession, and to give him a broad view of it as a basis for subsequent technical instruction.

24. **Elements of Forestry: Silviculture.** Second term. Credit three hours. Lectures, T Th 10. Practice, Th 1.40–4. Fernow 210. Professor Spring.

An elementary course covering the life history of the forest; forest planting, seeding, and nursery work; natural reproduction of the forest; care of the crop during its growth, including thinnings; protection from fire and other enemies. (See course 53.) Laboratory fee, $1.

Courses 24 and 53 may be taken independently. If both courses are taken, they should meet the needs of agricultural students who wish a more detailed knowledge of woodland management than is given in course 1.

53. **Elements of Forestry: Mensuration and Management.** Second term. Credit three hours. Lectures, T Th 9. Fernow 118. Practice, T 1.40–4. Fernow 118. Professor Bentley.

An elementary course including: estimating and measuring the amount of standing timber and its value; measurement of logs and other forest products; rate of growth of timber in diameter, height, and volume; value increment; age at which timber should be harvested; methods of regulating the amount of timber cut so as to insure a permanent income. (See course 24.) Laboratory fee, $2.

Forest Policy

111. **The Development of Forestry.** First term. Credit three hours. Open only to professional forestry students. Lectures, M W F 11. Fernow 122. Professor Hosmer.

The historical development of forestry in the leading countries of the world, with particular reference to its present status; the history of forestry in the United States under federal, state, and other auspices.

112. **Forest Policy: Federal and State.** Second term. Credit two hours. Open only to professional forestry students. Prerequisite, course 111. Lectures, M W 11. Fernow 118. Professor HOSMER.

The economic basis of forestry; the public-land policy in its relation to forestry in the United States; the forest policies of the Nation and of the several States, with special reference to the principles that underlie them; forest policy as expressed in law; forest taxation.

SILVICULTURE

121. **Timber Trees and Forest Regions.** First term. Credit four hours. Prerequisite, Botany 13. Lectures, M W F 10. Practice, W 1.40–4. Fernow 210. Professor BENTLEY.

An account of the forest regions of the world; detailed description of the forest regions of the United States and Canada; the distribution, importance, and silvical characteristics of a large number of the leading timber trees of the United States and Canada, and the identification of such of these as do not grow near Ithaca. (The identification of trees growing near Ithaca is included in Botany 13.) Laboratory fee, $2.

123. **Forest Planting.** Second term. Credit three hours. Lectures, until spring recess, M W 8; thereafter, W 8. Fernow 122. Practice, until spring recess, S 8–10.30; thereafter, S 8–1. Fernow 118. Professor SPRING.

Collection, care, and testing of tree seeds; identification of tree seeds and seedlings; raising trees in a forest nursery; starting forests by planting trees and by direct seeding; fixation of sand dunes; forestation on the prairies and under semi-arid conditions. Laboratory fee, $2.

124. **Silviculture A.** First term. Credit three hours. Prerequisite, course 121, and Botany 13 and 31 or their equivalents. Lectures, first half of term, M W F 9; thereafter, M W 9. Fernow 122. Field work, first half of term, F 1.40–4. Fernow 118. Professor SPRING.

A study of the standard methods of developing and reproducing forests; the methods of tending forests. Laboratory fee, $1.

125. **Silviculture B.** First term. Credit three hours. For seniors only. Prerequisite, course 124. Discussion period, Th 1.40–4. Fernow 118. Field work four Tuesdays prior to December 1, dates to be announced, 8–4; thereafter, 1.40–4. Fernow 118. Professor SPRING.

A study of the application of silviculture to the principal species of timber trees in the United States.

FOREST PROTECTION

131. **Forest Protection.** Second term. Credit three hours. Open only to professional forestry students. Lectures, M W F 9. Fernow 122. Professor HOSMER.

The protection of forests from fire and other enemies. Emphasis is placed on the principles underlying forest-fire control, especially as these are put in practice through the forest-fire plan. (Protection from injury by insects and fungi is covered in Entomology 43 and Plant Pathology 1 and 111, respectively.)

FOREST UTILIZATION

140. **Seasoning and Preservation of Timber.** Second term. Credit two hours. Prerequisite, Botany 22. Lectures, T Th 9. Fernow 210. Assistant Professor GUISE.

Kiln drying and air seasoning of wood; physical principles of drying; construction and operation of various types of commercial kilns; wood preservation, preservatives, methods of treating timber with chemical preservatives, and results obtained.

141. **Wood Technology.** Second term. Credit two hours. Prerequisite, Botany 22. Lectures, until spring recess, T Th 11; thereafter, T 11. Fernow 118. Practice, after spring recess, W, 1.40–4. Fernow 8. Professor RECKNAGEL.

Macroscopic structure of wood; physical, chemical, and mechanical properties of wood; technical uses of wood (paper pulp, destructive distillates, and the like);

identification, qualities, and uses of the wood of important trees. Laboratory fee, $2.

142. **Forest Utilization.** First term. Credit three hours. Lectures, M W F 10. Fernow 118. Professor RECKNAGEL.

Logging methods and equipment; logging in representative regions; manufacture of lumber; determination of stumpage values; timber-sale contracts; timber-sale administration, including marking, brush disposal, and scaling in practice; minor industries; the organization of the lumber industry; markets.

Field studies in forest utilization are made during the required month of camp, immediately preceding the fall term of the senior year, and during two or more field days in the fall term.

143. **Forest Industries.** Second term. Credit two hours. Prerequisite, course 142. Lectures, T Th 10. Fernow 118. Professor RECKNAGEL.

The organization and development of the forest industries, particularly the lumber industry and the pulp and paper industry, and their relation to forest management.

144. **Forest Engineering.** First term. Credit two hours. Prerequisite, plane trigonometry and courses in surveying. Lectures, M F 12. Fernow 122. Professor BENTLEY.

The construction of trails, roads, telephone lines, and the like, especially as applied in work on the national forests.

Opportunity for practice is afforded during the required month in camp.

FOREST MANAGEMENT

151. **Forest Mensuration.** Second term. Credit three hours. Lectures, T Th 11. Fernow 210. Practice, F 1.40–4. Fernow 118. Professor BENTLEY.

Measurement of logs and standing timber; timber cruising; volume tables. Laboratory fee, $3.

Opportunities for additional training in methods of forest mensuration are given during the month of required work in camp.

152. **Advanced Forest Mensuration.** First term. Credit two hours. Lectures, T Th 9. Fernow 210. Professor BENTLEY.

The growth and yield of stands, with the application of statistical methods thereto.

153. **Forest Management.** Second term. Credit three hours. Prerequisite, courses 124, 151, and 152. Lectures, M W F 9. Fernow 118. Assistant Professor GUISE.

The organizing of a forest property for management, with special attention to sustained yield and forest-management plans.

154. **Forest Administration.** Second term. Credit two hours. T Th 11. Fernow 122. Professor HOSMER.

The administrative organization and business practice in federal, state, and private forestry.

155. **Forest Finance.** First term. Credit three hours. Open to seniors and graduate students. Prerequisite, course 153. Lectures, M W F 9. Fernow 118. Assistant Professor GUISE.

The costs of growing timber; stumpage-value determination, and damage appraisal.

156. **Advanced Forest Management.** First term. Credit one or three hours. Open to seniors and graduate students. Prerequisite, course 153. Hours by appointment. Professor RECKNAGEL.

The making of a management plan based on the work done in the summer camp constitutes one credit hour.

254. **Statistical Methods in Forestry.** Second term. Credit two hours. For graduate students; open to seniors by special permission. Prerequisite, courses 152 and 155. Hours to be arranged. Assistant Professor GUISE.

The application of statistical methods to problems in forestry.

Advanced Forestry

261. **Seminary.** Second term. Without credit. For graduate students and qualified seniors. Hours to be arranged. Fernow 118. Professors Hosmer, Spring, Recknagel, Bentley, and Romell, and Assistant Professor Guise.

Field and classroom conferences on important phases of forestry.

262. **Advanced Work.** Throughout the year. Credit two or more hours a term. Open to graduate and undergraduate students who have had the necessary training. Hours by appointment. Professors Hosmer, Spring, Recknagel, Bentley, and Romell, and Assistant Professor Guise.

Individual advanced study of designated topics.

METEOROLOGY

1. **Elementary Meteorology.** First or second term. Credit three hours. Lectures, T Th 10. East Roberts 222. Laboratory, T W or Th 1.40–4. East Roberts 341. Professor Mordoff and Mr. Kelly.

This is a course designed to acquaint the student with the principles of the general and secondary circulation of the atmosphere; the elements of weather and climate; practical weather forecasting from weather maps and local observations. Laboratory fee, $2.

2. **General Climatology.** Second term. Credit two hours. Prerequisite, course 1. Lectures and recitations, M W 9. East Roberts 341. One conference period a week, by appointment. Professor Mordoff.

This course is designed to give a general knowledge of climatology and of the various climates of the United States, with emphasis on those of New York State.

211. **Research.** First or second term. Credit one or more hours a term. Prerequisite, permission to register. Hours by appointment. Professor Mordoff.

A course designed for advanced and graduate students. Original investigations in meteorology and climatology.

212. **Seminary.** First term. Credit two hours. Prerequisite, course 2 and permission to register. Hours to be arranged. East Roberts 341. Professor Mordoff.

Preparation and reading of reports on special topics; abstracts and discussions of papers dealing with the current literature of meteorology and climatology. A specific problem is required of each student.

PLANT BREEDING

101. **Genetics.** First term. Credit four hours. Prerequisite, Botany 1 and plant physiology, or Zoology 1 and either animal or human physiology. Courses in cytology and in taxonomic botany and zoology will be found helpful in connection with this course. Lectures, M W F 8. Plant Science 143. One conference period, to be arranged. Laboratory, M W or F 1.40–4. Plant Science 146. Assistant Professor Fraser and Dr. Dorsey.

A general introductory course designed to acquaint the student with the fundamental principles of heredity and variation. Special attention is given to the Mendelian interpretations of the facts of inheritance. Among the topics to be discussed are the physical basis of heredity, simple cases of Mendelian inheritance, factor interaction, the determination of sex, factor linkage, the measurement of variation, quantitative inheritance, pure lines, inbreeding and crossbreeding, maternal inheritance, and mutation, with suggestions as to the relation of genetical principles to eugenics. Laboratory studies of variation, and of the laws of heredity as illustrated by hybrid material in plants and by breeding experiments with the fruit fly, Drosophila. Laboratory fee, $3.

201. **Genetics, Advanced Course.** Second term. Credit three hours. Primarily for graduate students. Prerequisite, course 101 or its equivalent, Botany 124, and permission to register. Discussion periods, M F 8–10, and a laboratory problem in genetic analysis to be worked at the convenience of the student. Plant Science 146. Assistant Professor Fraser.

A course primarily for the study of methods of genetical testing and analysis. Particular attention is given to the formulation of hypotheses to explain genetical

phenomena, and to the development of tests of such hypotheses. A critical study is made of a number of the best examples of genetical analysis to be found in the periodical literature. The discussions involve a consideration of newer principles of genetics. Laboratory analyses of experimental data, and of an "unknown" stock of Drosophila. Laboratory fee, $3.

103. **Plant Breeding.** Second term. Credit three hours. (Students who have had course 101 will be allowed two hours credit.) Prerequisite, Botany 1, 31, and a general course in at least one of the following: farm crops, vegetable crops, floriculture, or pomology. Lectures, T Th 8. Lecture and practice, S 8–10. Plant Science 141. Professor C. H. MYERS.

A discussion of the principles primarily concerned in plant breeding, and the development of methods of breeding for different types of plants. Lectures are supplemented by periods in the laboratory, greenhouses, and experimental fields to acquaint the student with the technic of hybridization, selection, seed production, and distribution. The course is intended to be of value to those interested in plant production, seed growers, county agents, and teachers of agriculture in secondary schools.

105. **Plant Breeding: Crop Improvement.** First term (1931–32 only). Credit three hours. Prerequisite, Botany 1 and 31, and a general course in at least one of the following: farm crops, vegetable crops, floriculture, or pomology. Lectures, T Th S 9. Plant Science 143. Acting Professor PARKER.

Plant-breeding principles and practices as applied to field crops, plant introduction, variety testing, mass and pedigree (pure-line) selection, hybridization, mutation. Special attention to breeding crop plants for resistance to plant diseases and insects.

108. **Plant Breeding Literature.** Second term (1931–32 only). Credit one hour. Prerequisite, course 105 or 103 or its equivalent. Lecture and practice, W 8. Plant Science 146. Acting Professor PARKER.

Descriptive and critical study of books, journals, and current papers in the field of genetics and plant breeding. Use of abstract journals, and bibliographic practice.

211. **Biometry.** Second term. For graduate students only. Th 1.40–4. Plant Science 146. Assistant Professor LIVERMORE.

A discussion of statistical methods as applied to problems in biology and genetics. The course is designed primarily to develop methods for the study of variation, correlation, curve fitting, and probable error. It is not intended solely for students in plant breeding, but is of interest to all who are to engage in experimental work.

222. **Seminary.** Second term. For graduate students only. W 11. Plant Science. Professors EMERSON, MYERS, BUSSELL, and PARKER, Assistant Professors FRASER, WIGGANS, and LIVERMORE, and Dr. DORSEY.

A seminary for the discussion of special topics in genetics, plant breeding, and statistical methods, and for the presentation of reports on the research problems of graduate students and members of the staff.

PLANT PATHOLOGY

1. **General Plant Pathology.** First or second term. Credit three hours. Prerequisite, Botany 1 or its equivalent. Lecture, W 8. Plant Science 336. Practice, first term, any two periods, W Th F 1.40–4 or S 10.30–12.50; second term, W F 1.40–4. Plant Science 341 and 343. Professor WHETZEL, Assistant Professor WELCH, and Messrs. DAVIS, BLACK, WINTERS, and ———.

A fundamental course treating of the nature, cause, and control of plant diseases, illustrated by studies of the commoner diseases of cultivated crops. Laboratory fee, $4.50; breakage deposit, $3.

201. **Advanced Plant Pathology.** First and second terms. Credit three hours. Prerequisite, courses 1 and 2. Lecture, F 8. Plant Science 336. Practice, T F 10–12.30. Plant Science 342. Professor MASSEY and Mr. DAVIS.

A presentation and analysis of the experimental and empirical knowledge of plant diseases. The phenomena of infection, susceptibility, suscept reactions, and symptomatology is critically considered. Laboratory fee, $4.50; breakage deposit, $3.

2. **Principles of Plant-Disease Control.** First term, graduates; second term, undergraduates. Credit three hours. Prerequisite, course 1. Lecture, Th 8. Plant Science 336. Practice, Th 1.40–4, S 8–10.30. Plant Science 342. Professor WHETZEL and Mr. WINTERS.

A consideration of the principles and methods of controlling plant diseases. This includes studies on: exclusion by laws, regulations, quarantine, inspection, and disinfection; eradication by pruning, seed selection, tree surgery, rotation, disinfection, and other means; protection by spraying, dusting, wound dressing, and the like; immunization by selection, breeding, and feeding. Number taking the course limited to twenty-four. Admission, if registration is in excess of this number, on the basis of average scholastic standing to date. Laboratory fee, $4.50; breakage deposit, $3.

111. **Forest and Shade-Tree Pathology, and Tree Surgery.** Second term. Credit two hours. Prerequisite, course 1. Lecture, M 10. Plant Science 336. Practice, T or Th 1.40–4. Plant Science 362. Assistant Professor WELCH and Mr. ———.

A course designed especially for students in forestry and ornamental horticulture, dealing with the recognition and control of diseases of forest, shade, and ornamental trees and shrubs, and the principles of tree repair. Laboratory fee, $2.50; breakage deposit, $3.

121. **Comparative Morphology of Fungi.** First term. Credit four hours. Alternates with course 122. Prerequisite, Botany 1 or its equivalent, and permission to register. Lectures, M W 9. Practice, M W 1.40–4. Plant Science 333. Professor FITZPATRICK and Mr. JENKINS.

A synoptical course designed to introduce the beginner to the general field of mycology. Emphasis is placed on morphology and phylogeny, rather than on taxonomy. Laboratory fee, $6; breakage deposit, $3.

[122. **Introductory Mycology.** First and second terms. Credit four hours. Alternates with course 121. Prerequisite, Botany 1 or its equivalent, and permission to register. Professor FITZPATRICK and Mr. JENKINS.] Not given in 1931–32.

A general introductory presentation covering the whole field of mycology. As in course 121, comparative morphology and phylogeny are stressed, but a much more detailed treatment of taxonomy is given. Laboratory fee, $6; breakage deposit, $3.

[221. **Mycology.** First and second terms. Credit four hours. Alternates with course 222. Prerequisite, Botany 1 or its equivalent, and permission to register. Professor FITZPATRICK and Mr. JENKINS.] Not given in 1931–32.

An intensive course designed especially for students who wish to specialize in mycology or in mycological aspects of plant pathology. A detailed treatment of the Phycomycetes and Ascomycetes. Laboratory fee, $6; breakage deposit, $3.

222. **Mycology.** First and second terms. Credit four hours. Alternates with course 221. Prerequisite, Botany 1 or its equivalent, and permission to register. Need not be preceded by course 221. Lectures, M W 11. Practice, T Th 1.40–4. Plant Science 329. Professor FITZPATRICK and Mr. JENKINS.

An intensive course designed especially for students who wish to specialize in mycology or in mycological aspects of plant pathology. A detailed treatment of the Basidiomycetes and Fungi Imperfecti, supplemented by a brief consideration of the Myxomycetes. Here, and in course 221, emphasis is placed on field work, and extensive practice in determination of fungi in many groups is gained. Laboratory fee, $6; breakage deposit, $3.

231. **History of Plant Pathology.** First and second terms. Credit one hour. Prerequisite, course 1 and a reading knowledge of French and German. Professor WHETZEL.

232. **German Phytopathological Reading.** First and second terms. For graduates and advanced students. Without credit for undergraduate students. Practice, W Th F S 9. East Roberts 232. Professor WHETZEL.

241. **Research.** Throughout the year. Not less than three laboratory periods of three clock hours a week. Professors and assistant professors of the departmental staff.

Laboratory fee, $1.50 a credit hour; breakage deposit, $3.

242. **Seminary.** First and second terms. Required of graduate students taking work in the department. T 4.30–6. Plant Science Seminar Room.

243. **Literature Review.** Optional. Biweekly. Time to be arranged.

POMOLOGY

1. **General Pomology.** Second term. Credit three hours. Lectures, T Th 8. Plant Science 143. Laboratory, M T or Th 1.40–4. Plant Science 114. Professor CARRICK and Mr. LEVERING.

A study of the general principles and practices in pomology; propagation and care of orchard trees and small fruits; harvesting, storing, and marketing fruit; practical work in budding, grafting, pruning, and planting; study of varieties, growth, and fruiting habits.

2. **Fruit Varieties.** First term. Credit two hours. Prerequisite, course 1. Lecture or laboratory, T Th 8–10. Plant Science 107. Professor MACDANIELS and Mr. LEVERING.

A study of the most important varieties of apples, pears, peaches, plums, grapes, and small fruits from the standpoint of their identification, growth characters, regional adaptation, season of ripening, storage quality, and other matters of a similar nature. A part of the time is given to the judging of exhibition fruit, and the Farm and Home Week fruit exhibit is set up by the students in this course.

111. **Packing and Storage of Fruit for Market.** First term. Credit two hours. Prerequisite, courses 1 and 2, S 8–1. Plant Science 114 and the packing house. Professor CARRICK.

The important factors in harvesting and handling fruit which affect quality and marketability are studied. Particular emphasis is placed on packing apples, in barrels, baskets, boxes, and other retail packages, but the work covers also such fruits as peaches, pears, and grapes, in so far as these are available. The effect of grades and packages on distribution and marketing is fully discussed, and consideration is given to some of the problems of market inspection. The principles and practices of common and cold storage also are considered.

112. **Advanced Laboratory Course.** Second term. Credit two hours. Intended for students doing their major work in pomology. S 8–1. Plant Science 107. Professors HEINICKE, CARRICK, and MACDANIELS.

This course is designed to give more extended practice in the various orchard operations than can be given in course 1. Special attention is given to problems of pruning, tree surgery, bracing, orchard soil selection and management, and pest control.

121. **Economic Fruits of the World.** First term. Credit three hours. Given in alternate years. Prerequisite, course 1. Lectures, T Th 11. Laboratory, W 1.40–4. Plant Science 107. Professor MACDANIELS and Mr. LEVERING.

A study of all species of fruit-bearing plants of economic importance, such as the date, the banana, the citrus fruits, the nut-bearing trees, and the newly introduced fruits, with special reference to their cultural requirements in the United States and its insular possessions. All fruits not considered in other courses are considered here. The course is designed to give a broad view of world pomology and its relationships with the fruit industry of New York State. Emphasis is placed on botanical relationships and fruit structure.

131. **Advanced Pomology.** First term. Credit four hours. Prerequisite, courses 1 and 2, and Botany 31. Discussions, M W F 9. Plant Science 141. One conference period, to be arranged. Professor HEINICKE.

A comprehensive study of the sources of knowledge and opinion as to practices in pomology; methods and difficulties in experimental work in pomology, and results of experiments that have been concluded or are being conducted.

201. **Research.** Throughout the year. Credit one or more hours a term. Prerequisite, course 131. Professors HEINICKE, CARRICK, OSKAMP, MACDANIELS, and PECK.

200. **Seminary.** Throughout the year, without credit. Required of students taking course 201 and of graduate students in pomology. M 11. Plant Science Seminar Room. Members of the departmental staff.

202. **Special Topics in Pomology.** First, second, or both terms. Credit two or more hours a term. Open to qualified seniors and to graduate students. Two discussion or laboratory periods a week, to be arranged. Professor HEINICKE, Professor CARRICK, or Professor MACDANIELS.

Different topics will be considered each term, the aim being to cover the entire field in two years. In this course the student is expected to review critically and evaluate the more important original papers relating to pomological practice and research. The laboratory will aim to acquaint the student with the technic in various phases of pomological research. Interpretation of the literature is made on the basis of the fundamental principles of plant biology and recent experimental methods.

POULTRY HUSBANDRY

1. **Farm Poultry.** Second term. Credit four hours. Lectures and recitations, M W F 9. Poultry Building 375. Practice, Th or F 1.40–4 or S 8–10.20. Poultry Building 300. Professors RICE and HEUSER, Extension Professor BOTSFORD, Assistant Professors HALL and BRUNETT, and Mr. ————.

A brief general course dealing with the practical application of the principles of poultry husbandry to general farm conditions, designed for students not intending to take the specialized poultry courses.

2. **Poultry Nutrition.** Second term. Credit three hours. Not open to freshmen. Lectures, T Th 9. Practice, Th 1.40–4. Poultry Building 325. Professor HEUSER and Research Assistant Professor NORRIS.

The principles of poultry nutrition, including: methods of feeding for egg production, rearing, and fattening; the study of feeds suitable for poultry; the compounding of rations; and practice in poultry-feeding management.

102. **Advanced Poultry Nutrition.** First and second terms. Credit one hour a term. For seniors taking course 141 and graduate students. Prerequisite, course 2. Registration by appointment only. Weekly discussion, time to be arranged. Poultry Building 325. Research Assistant Professor NORRIS.

A study of experimental methods involved in conducting research projects in poultry nutrition, together with a critical review of current literature about poultry nutrition and allied subjects.

3. **Poultry Incubation and Brooding.** Second term. Credit three hours. Lecture, M 11. Practice, M 1.40–4; also reporting three times daily, including Sunday, for approximately six weeks, hours to be arranged by appointment. Poultry Building 325. Mr. ————.

Principles and practice of incubation and brooding. Daily practice for three weeks in operating incubators and for three weeks in the management of a brooder and a flock of chickens.

11. **The Breeds of Poultry, and Judging.** First term. Credit two hours. Not open to freshmen. Lecture or recitation, F 11. Poultry Building 325. Practice, Th or F 1.40–4. Breed Observation House. Assistant Professor HALL.

The origin, history, and classification of breeds of domestic poultry; judging the principal breeds for fancy and production points by score-card and comparison methods; fitting fowls for exhibition. A required trip is made to one of the leading poultry shows the second or third week of January.

12. **Poultry Breeding.** Second term. Credit two hours. Prerequisite, course 11. Lecture or recitation, F 11. Poultry Building 375. Practice, F 1.40–4. Poultry Building 325. Assistant Professor HALL.

The principles and practices of poultry breeding. Trips to near-by farms are made.

31. **Marketing Poultry Products.** First term. Credit three hours. Lecture or recitation, M W 11. Poultry Building 325. Practice, M or T 1.40–4. Poultry Building 100.

Preparation of poultry and eggs for market, and study of marketing problems. A weekly market news letter is prepared by students in the class. A class trip to New York City markets is required of all students. A three-day study of marketing in all its phases is made on this trip, which immediately follows the Christmas recess. The total necessary expense is about $35.

31a. **Advanced Poultry Marketing.** Second term. Credit two hours. Prerequisite, course 31. Recitations, T Th 11. Poultry Building 325.

An analysis of market reports is taken up in this course. Further studies in statistical information bearing upon better and more intelligent marketing of poultry products are made, and the preparation of the weekly market letter is continued.

135. **Poultry Management and Housing.** Second term. Credit four hours. Prerequisite, eight hours credit in poultry courses, and accompanying registration in six hours more of poultry courses. Lectures, T Th 10, W 8. Laboratory, W 1.40–4. Poultry Building 325. Professor RICE and Extension Professor BOTSFORD.

The principles of farm management as applied to poultry farming. Selection of the farm, consideration of the construction, design, and arrangement of buildings, and a study of the principles of poultry-house construction. The farm layout and a study of farm records.

137. **The Field of Poultry Husbandry.** First term. Credit one hour. Lecture, T 9. Poultry Building 325. Professor RICE.

A study of the general field of poultry husbandry for students specializing in the department. About one-fourth of the term is devoted to a study of the industry, its growth, magnitude, and distribution, and factors tending to limit or expand its growth. One-fourth of the term is devoted to a study of the opportunities in the field of poultry husbandry, and the remainder to a consideration of the national poultry organizations and national poultry problems.

141. **Research.** First or second term, or throughout the year. Credit one or more hours a term. Prerequisite, permission to register. Time arranged by appointment. Poultry Building. Members of the departmental staff.

An original investigation of a problem in poultry husbandry, to be presented as a written thesis. Frequent conferences are required of all students electing this course.

242. **Seminary.** Throughout the year. Required of all graduate students in poultry husbandry and of seniors taking course 141. Time to be arranged. Poultry Building 325. Members of the departmental staff.

A discussion of advanced work in poultry husbandry.

RURAL EDUCATION

In addition to the facilities for the observation of teaching made available through the courtesy of the Ithaca Public Schools, the department maintains a critic teacher of vocational agriculture in the Trumansburg High School, and a critic teacher of vocational homemaking in the Trumansburg High School and one in the Groton High School, where students in training participate in teaching under the direction of the staff members who have charge of teacher training in these fields.

Courses are grouped by decades: Introductory, 1–9; Psychology, 10–20; Educational Method, 21–40; Preparation of Teachers for Normal Schools and Colleges 41–50; Educational Measurement, 51–60; Educational Administration and Supervision, 61–80; Principles of Education, 81–99. See page 31 for further statement regarding the numbering of courses.

Introductory

1. **Introduction to Problems of Public Education.** First term. Credit two hours. Not open to freshmen. Designed for students not preparing to teach. Not credited toward the professional requirements in education. T Th 10. Caldwell 100. Professor Moore.

Psychology

110. **Psychology: An Introductory Course.** First or second term. Credit three hours. Open to students above the freshman year. M W F 10. Stone 203. Assistant Professor Winsor.

111. **Psychology for Students of Education.** First or second term. Credit four hours. Open to juniors and seniors. Assistant Professor Bayne and Miss Gardner.

First term:

Section 1: lectures, M W F 11; laboratory, T 1.40–4; Stone 203.
Section 2: lectures, M W F 9; laboratory, Th 1.40–4; Stone 203.
Second term:
Section 1: lectures, M W F 11; laboratory, T 1.40–4; Stone 203.
Section 2: lectures, M W F 8; laboratory, Th 1.40–4; Stone 203.

114. **Psychology for Students of Hotel Administration.** First term. Credit four hours. Open to juniors and seniors. Lectures, M W F 8. East Roberts 222. Laboratory, W 1.40–4. Stone 309. Assistant Professor Winsor.

116. **Psychology for Students of Child Training.** Second term. Credit two hours. Open only to students who have had course 111. T Th 11. Caldwell 100. Professor Kruse.

119. **Personnel Administration.** Second term. Credit three hours. Prerequisite, course 114 or its equivalent. M W F 9. Stone 203. Assistant Professor Winsor.

211a. **Psychology for Students of Education.** First term. Credit four hours. For mature students with teaching experience. M W F 11–12.20. Stone 309. Professor Kruse.

[211b. **Psychology for Students of Education.** Second term. For members of the teaching staff. Professor Kruse.] Not given in 1931–32.

[212. **Psychology of Learning.** Second term. Credit two hours. Professor Kruse.] Not given in 1931–32.

218. **Seminary in Educational Psychology.** Second term. Credit two hours. Th 4–6. Stone 102. Professor Kruse.

Educational Method

121. **Method and Procedure in Secondary School Teaching.** First term. Credit three hours. Open to juniors and seniors who have completed course 111. Students preparing to teach home economics should take course 181. M W F 11. Stone 102. Professor Ferriss.

The development of certain principles of teaching in secondary schools, and their application to practical questions arising from the problems of selecting and organizing teaching materials, planning class work, making the assignment, determining classroom and laboratory methods, directing study, managing the class, measuring the results of teaching, and so forth, considered in the light of the principles developed.

126. **The Teaching of Science in the Secondary School.** Second term. Credit two or three hours. Prerequisite, courses 111 and 121 or their equivalents. Lectures, T Th 10. Fernow 16. Professor Palmer.

This course is concerned with the organization of high-school science material, the introduction of scientific ideas to high-school students, and a consideration of useful sources of information and supply. Opportunity is provided for observation of high-school science teaching for the third hour of credit.

131. **The Teaching of Agriculture in the Secondary School.** First and second terms. Credit three hours a term. Open to students who have completed course 111, who have met the farm-practice requirement, and whose progress in the prescribed courses in agriculture is adequate. Lectures, T Th 9. Stone 203. One conference hour and not less than one laboratory period a week in directed teaching are required. Professor STEWART and Messrs. HOSKINS and PACKER.

A course for students preparing to teach agriculture in the secondary school, including participation in the organization of departmental work and in teaching.

133. **Directed Teaching of Agriculture in the Secondary School.** First or second term. Credit one to three hours. Registration by permission. Professor STEWART and Mr. PACKER.

135. **The Teaching of Home Economics in the Secondary School.** Second term. Credit three hours. Prerequisite, course 111. Required of juniors preparing to teach home economics. Course 181 or its equivalent should precede or parallel this course. Lectures, T Th 8. Laboratory, T or Th 1.40–4. Stone 102. Professor BINZEL.

This course purposes to interpret present-day educational theories and practices as applied to home economics; to study the activities in which the home-economics teacher engages, and the factors which make for successful performance.

136. **Directed Teaching of Home Economics in the Secondary School.** First or second term. Credit two or three hours. Prerequisite, course 135. Students planning to take this course should arrange with the department during the junior year. General conferences, S 8–10. Stone 203. Professor BINZEL and Misses BULL and HASTIE.

This course is designed to give students opportunity for observation and teaching under the guidance of the department. A week-end trip for the purpose of studying equipment is a part of the course.

[222. **Principles of Method.** Second term. Credit two hours. Prerequisite, course 211a or its equivalent, and teaching experience. Professor STEWART.] Not given in 1931–32.

Designed to discover and develop through concrete situations the principles underlying successful teaching experience.

223. **The Teaching of Elementary-School Subjects.** First term. Credit three hours. Given in alternate years. M W F 8. Stone 203. Professor MOORE.

A course designed for experienced elementary-school teachers, supervisors, and others who are concerned with recent developments in this field. A critical consideration of important research studies which have a direct bearing upon the teaching of the elementary-school subjects.

226. **Research in Science Teaching.** First or second term. Credit one or two hours. Open to graduate students who have had courses 111, 121, and 7. Professor PALMER.

Special problems in science teaching.

227. **Seminary in Elementary Education.** Second term. Credit two hours. T 4–6. Stone 203. Professor MOORE.

Open to graduate students who are especially interested in elementary-school problems. The topics considered will vary from year to year, depending upon the interest of those participating.

228. **Seminary in Child Guidance.** Second term. For graduate students who have had some work in child guidance. Professor WARING.

234. **Seminary.** First term. Credit one hour. Th 4–5.30. Stone 203. Professor BUTTERWORTH.

A consideration of scientific methods in education, with particular reference to thesis writing.

239. **Methods in Extension Teaching.** Second term. Credit two hours. Open to graduate students intending to serve in the field of cooperative extension work in agriculture or home economics, and to members of the staff in cooperative extension work. Prerequisite, course 211a or equivalent in educational psychol-

ogy. Not given unless six or more register. Hours will be arranged to meet the convenience of the group enrolled. Professor EATON.

A study of "direct contact methods" of teaching in cooperative extension work in agriculture and home economics.

240. **Educational Aspects of Cooperative Extension Work in Agriculture and Home Economics.** First term. Credit three hours. Open to graduate students informed or experienced in the system of cooperative extension work in agriculture and home economics. Hours will be arranged to meet the convenience of the group enrolled. Professor EATON.

A study of educational aims, programs, and values in cooperative extension work in agriculture and home economics.

PREPARATION OF TEACHERS FOR NORMAL SCHOOLS AND COLLEGES

241. **The Preparation of Teachers for Normal Schools and Colleges.** Second term. Credit three hours. M W F 10. Stone 102. Professor BUTTERWORTH.

A course designed to meet the needs of those responsible for the training of teachers in rural elementary and secondary schools.

243. **Problems of College Teaching.** Second term. Open to graduate students intending to teach in colleges and to members of the staff of resident instruction. Not given unless six or more register. Hours will be arranged to suit the convenience of the group enrolled. Professor EATON.

A study of the immediate objects of the college teacher, and of course organization and methods designed to attain them.

245. **College Preparation of Teachers of Agriculture for Secondary Schools.** Second term. Credit three hours. Open to graduate students of approved qualifications. M W F 9. Stone 102. Professor STEWART.

A study of college training for prospective teachers of vocational agriculture in secondary schools.

248. **The Preparation of Teachers of Home Economics.** First term. Credit three hours. Open to graduate students of approved qualifications. T Th S 10. Stone 203. Professor BINZEL.

This course is designed to meet the needs of persons who have had both technical preparation in home economics, and teaching experience, and who desire to prepare for the special problems involved in the professional work of preparing teachers of home economics.

[250. **Seminary in Agricultural Education.** Second term. Credit one hour. For graduate students doing research in agricultural education. Professor STEWART.] Not given in 1931–32.

EDUCATIONAL MEASUREMENT

251. **Mental and Educational Measurement.** Second term. Credit three hours. Prerequisite, permission to register. Primarily for graduate students. M W F 8. Stone 309. Assistant Professor BAYNE.

Mental and educational measurement in relation to the classification of pupils, determination of the progress of pupils, and other problems of the teacher, the supervisor, and the administrator.

252. **Conferences on Statistical Methods.** Throughout the year. Credit may be arranged. Designed primarily for students of education. By appointment. Stone. Assistant Professor BAYNE.

253. **Statistics for Students of Education.** First term. Credit two hours. Primarily for graduate students in education. T Th 8. Stone 203. Assistant Professor BAYNE.

A study of common statistical procedure in relation to critical reading of technical studies in education, research, and writing reports of studies. Emphasis is placed upon an understanding of the appropriate use of statistical procedures rather than upon skill in computation of statistical measures. As far as possible the work is related to the problems of the individual student.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

[161. **Principles of School Administration and Supervision.** First term. Credit three hours. Open to juniors and seniors who have had courses 111 and 121 or 181. Open also to graduate students without administrative experience who have had the above-named courses or their equivalents. Professor BUTTERWORTH.] Not given in 1931–32.

An introductory course covering the general problems of administration in elementary and secondary schools; types of school units; state and county organization; functions of boards of education; selection, promotion, and tenure of teachers; training teachers in service; pupil accounting; the school building; curriculum reconstruction; financing the school system; and the like.

[175. **The Principalship of Centralized and Village Schools.** Second term. Credit two hours. Given in alternate years. Open to graduate students by special permission. Professor FERRISS.] Not given in 1931–32.

A course designed primarily for those preparing to be principals of schools containing both the high school and the elementary grades. Attention is given to the needs of those combining the work of principal and teacher of agriculture.

261. **The Administration of Rural Schools.** First term. Credit three hours. T Th 11–12.20. Stone 203. Professor BUTTERWORTH.

A course for students of experience, dealing with the problems of organizing and administering education in the elementary and secondary schools of country and village districts.

262. **Special Problems in School Administration.** This course is divided into units in such a manner as to include the major problems of the school administrator. Professor BUTTERWORTH.

[A. **School Finance.** Second term. Credit two hours.] Not given in 1931–32.

B. **The School Population.** Second term. Credit two hours. T Th 9. Stone 309.

The school census, attendance, grading and promotion, retardation, elimination, and similar problems.

[C. **The School Plant.** Second term. Credit two hours.] Not given in 1931–32.

263. **Procedures and Technic in Supervision.** First term. Credit three hours. M W F 10. Stone 102. Professor MOORE.

The purpose of this course is to assist graduate students of experience to improve their supervisory procedures and technic. The course includes a survey of the literature related to supervisory problems, and an evaluation of the theories and practices involved. Schools are visited, and procedures are observed from the viewpoint of the supervisor.

[264. **Seminary in Rural-School Administration.** Second term. Credit two hours. Professor BUTTERWORTH.] Not given in 1931–32.

Designed for those desiring to make an intensive study of administrative problems in rural elementary and secondary schools.

267. **Administration and Supervision of Agricultural Education.** First term. Credit three hours. Open to graduate students of approved qualifications. M F 2–3.20. T Th 9 should be kept free. Stone 203. Professor STEWART.

A course designed for persons preparing to administer and supervise agricultural education. Participation in field experience, study, and supervision make up a part of the program.

[269. **The Administration and Supervision of Home-Economics Education.** First term. Credit three hours. Given in alternate years. Open to graduate students only. Professor BINZEL.] Not given in 1931–32.

This course is intended for supervisors, and for teachers who are preparing for supervisory positions, in the field of home economics. The course is concerned with the analysis of the supervisor's job and with methods of supervision. Among the problems presented for study and investigation are: the organization and administration of homemaking departments; principles underlying the present-day changes in home-economics education; principles underlying the organization

of courses; evaluation of teaching; improvement of teachers in service; teachers' conferences and study classes.

276. **Principles of Curriculum Building.** Second term. Credit three hours. For graduate students only. T Th 2–3.20. Stone 309. Professor FERRISS.

A consideration of the major problems, principles, and technic in determining educational objectives and curriculum content and organization, with special emphasis upon elementary and secondary education in rural communities.

278. **Seminary in Rural Secondary Education.** Second term. Credit two hours. Given in alternate years. M 4–5.30. Stone 203. Professor FERRISS.

Special topics are pupil guidance and providing for individual differences. Other topics may be substituted if the interests of those participating make it desirable.

PRINCIPLES OF EDUCATION

181. **Principles of Education.** Second term. Credit three hours. Open to juniors and seniors who have completed course 111. Students preparing to teach home economics should take this course. Section 1, M W F 11, Caldwell 100; section 2, M W F 9, East Roberts 222. Professor MOORE.

A consideration of fundamental principles of education, with special attention to the needs of prospective teachers in the high school.

194. **Education and Vocations.** First term. Credit three hours. Open to graduate students and seniors who have had educational psychology, and economics of sociology. T Th S 11. Stone 102. Professor EATON.

A study of vocational education from the point of view of a democratic philosophy of education.

281. **Rural Secondary Education.** First term. Credit four hours. Designed primarily for graduate students. M W F 9, and a period to be arranged. Stone 309. Professor FERRISS.

A course to consider some of the more basic problems in the nature, organization, curriculum, and extension of secondary education in its adaptation to rural needs and conditions. Among the topics treated are: functions of rural secondary education; present demands upon the rural secondary school; problems of organization; problems of curriculum building; prevocational and vocational work; pupil guidance; extra-class activities; the rural secondary school and the adult.

287. **The Junior High School and the Rural Community.** Second term. Credit two hours. T Th 11. Stone 203. Professor FERRISS.

A survey of the development of the junior high school, with particular reference to its function in rural communities. Discussion falls under headings such as: its place in the reorganization of public education; its aims and essential features; types of administrative organization; types of curricular organization; and other problems incident to the establishment and operation of a junior high school in the small town or the open country.

294. **Philosophy of Education.** Second term. Credit three hours. Open to graduate students whose studies in education are well advanced. M W 11–12.30. Stone 102. Professor EATON.

A critique of education.

NATURE STUDY

7. **The Teaching of Nature Study.** Second term. Credit three hours. Prerequisite, one-half year of botany, biology, or zoology, and a physical science. Lecture, M 12. Fernow 16. Practical exercises, M W 1.40–4 or T Th 1.40–4. Professor PALMER.

Laboratory and field practice with those subjects in physical and biological science most suitable for use in elementary schools, with attention given to methods of study, manner of presentation, and relation of the topics to agriculture.

102. **Nature Literature.** First term. Credit two hours. Prerequisite, courses 111, 121, and 7. M W 10. Fernow 16. Professor PALMER.

Discussions of the history of the nature movement, with consideration of the contributions made to it and to elementary-school methods by dramatists, and

writers of prose, poetry, and fiction. The graded courses in nature-study outlines for various States are considered, to assist in the perfection of similar work in the public schools in New York State.

[109. **The Nature-Study Movement and Its Makers.** First term. Credit two hours. Prerequisite, courses 111, 121, and 7. Professor PALMER.] Not given in 1931–32.

A study of the past and the present status of nature and science education in elementary schools.

RURAL SOCIAL ORGANIZATION

1. **Introduction to Sociology.** Second term. Credit three hours. Open to sophomores. Not open to freshmen except those registered in the curriculum for social workers in the College of Home Economics. Lectures and discussions: section 1, M W F 8; section 2, T Th S 8. Fernow 210. Assistant Professor ANDERSON and Mr. BEERS.

This course precedes all others in the department. Its object is to create an understanding of institutions, organizations, and various types of groups that exist in human society; it is an analysis of the human environment in which the individual lives. Both urban and rural society are considered. Fee for materials, $1.50.

12. **Rural Sociology.** Second term. Credit three hours. Open to sophomores. Prerequisite, course 1 or its equivalent, or special permission. T Th S 11. Fernow 308. Mr. BEERS.

Primarily for students whose homes are in rural communities. A study of the groups, institutions, and organizations found in rural society. The structure and functions of rural groups are first analyzed, and attention is then given to the processes of group action and the results. Lectures, discussions, special class reports, and special papers.

[111. **Rural Community Organization.** Second term. Credit two hours. Prerequisite, course 1 or 12 or the equivalent. Professor SANDERSON.] Not given in 1931–32.

A consideration of the aims and methods of the organization of rural communities. Typical communities are studied, their problems are analyzed, and a method of organization is discussed. The county as a unit of social organization also is considered in its relation to community organization.

121. **The Family.** First term. Credit four hours. Open to juniors, seniors, and graduate students; open to sophomores only if registered in the curriculum for social workers in the College of Home Economics. Prerequisite, course 1 or its equivalent. Lectures, discussions, group conferences, and reports. Section 1, T Th S 8; section 2, T Th S 11, and a one-hour group conference to be arranged. Fernow 210. Professor SANDERSON.

This course considers the social problems of the family both on the farm and in the city; the history of the family, particularly during the past century; the differences between family life in the country and in the city; the function of the family in society; marriage and divorce; relations of parents and children; and how the family may be conserved. Fee for materials, $3.50.

122. **Social Problems and Public Welfare Organization.** Second term. Credit three hours. M W F 8. Fernow 308. Assistant Professor ANDERSON.

A study of social problems such as poverty, delinquency, crime, the physically handicapped, the feeble-minded and mentally diseased, social insurance, public health, mothers' pensions, unemployment, and the like; a consideration of public and private agencies for social work and desirable public policy with regard to their organization and support.

123. **Field Work in Rural Society.** Throughout the year. Open only to advanced students by special permission. All work is individual. Hours and credit to be arranged. Professor SANDERSON.

[132. **Rural Leadership.** Second term. Credit two hours. Prerequisite, permission to register.] Not given in 1931–32.

A seminary course in which a descriptive account of leadership is given from a psychological point of view. General principles are discussed, with special case references to studies of rural leaders in New York and other States.

211. **The Rural Community.** First term. Credit three hours. A seminary course primarily for graduate students. Prerequisite, courses 1 and 12 or their equivalents. Th 2–4. Fernow 308. Professor SANDERSON.

A study of the historical development of the rural community; a comparative study of types of rural communities; the rural community as a sociological group, and its place in society; methods of community development and organization.

213. **Research in Rural Social Organization.** Throughout the year. For graduate students only. Hours and credit to be arranged. Professor SANDERSON.

[214. **Seminary.** First term. For graduate students. Professor SANDERSON.] Not given in 1931–32.

The structural characteristics and classification of different types of social groups as related to their functions are studied.

216. **Systematic Sociology.** Second term. Credit two hours. For graduate students. W 2–4. Fernow 308. Assistant Professor ANDERSON.

This is a seminary course designed to present in a systematic way the whole field of sociology, with special emphasis on sociological theory. The work is divided between discussions concerning the essential aspects of the subject, and reports on special topics.

221. **Sociological Theory and Research.** First term. Credit three hours. Prerequisite, permission to register. T 2–4. Fernow 308. Professor SANDERSON.

A seminary course devoted to the critical analysis of recent and contemporary sociological theory.

VEGETABLE CROPS

Students planning to specialize to a greater or less degree in vegetable crops should consult the department regarding choice and sequence of courses. A mimeographed sheet outlines the suggestions.

1. **Vegetable Crops.** Second term. Credit three hours. Lectures, W F 11. East Roberts 222. Laboratory, Th or F 1.40–4. Vegetable greenhouses and East Ithaca gardens. Professor WORK.

A general study of the principles of vegetable growing and handling, giving a comprehensive survey of the industry. Intended for the student who desires a brief general course, and as an introductory course for the student who wishes to specialize in commercial vegetable growing. Economic importance, geography, cultural requirements, marketing, storage, and uses, of the important vegetables. A one-day trip is required; approximate cost, $4. Laboratory fee, $2.

101. **Vegetable Crops, Advanced Course.** Second term. Credit three hours. Prerequisite, course 1 and Botany 31. Lectures and discussions, M W F 9. East Roberts 212. Professor THOMPSON.

A systematic study of research results in vegetable production and handling, and their application to the solution of practical problems.

2. **Special Vegetable Crops.** Second term. Credit three hours. Botany 1 should precede or accompany this course. Lectures, T Th 10. East Roberts 212. Laboratory, T or W 1.40–4. East Roberts. Professor HARDENBURG.

A special study of those crops which are grown in New York principally as cash crops and for manufacture, including potatoes, field beans, field cabbage, and the important canning crops, peas, tomatoes, sweet corn, and snap beans. About one-third of the term's work is devoted to potatoes. A visit to near-by bean elevators is required; approximate cost, $2. Laboratory fee, $2.

11. **Vegetable Forcing.** Second term. Credit three hours. Prerequisite, course 1. Given in alternate years. Lectures, W F 8. East Roberts 222. Laboratory, W 1.40–4. Vegetable Greenhouses. Professor WORK.

Growing vegetables under glass; greenhouses for vegetables; management problems; the greenhouse crops, their requirements and culture. Laboratory work consists chiefly of practical exercises in crop production. A one- or two-day

excursion to Rochester to visit greenhouses is required; approximate cost, $9. Laboratory fee, $2.

12. **Grading and Handling Vegetable Crops.** First term. Credit three hours. Lectures, T Th 10. East Roberts 212. Laboratory, T or Th 1.40–4. East Roberts. Professor WORK.

Geography of vegetable production and distribution. Factors of environment, culture, and handling as affecting quality, condition, and marketing of vegetable crops. Harvesting, grades and grading, packing, shipping-point and terminal market inspection, transportation, refrigeration, and storage are discussed with reference to the various crops. A two-day trip is required; approximate cost, $10. Laboratory fee, $2.

13. **Types and Varieties of Vegetables.** First term. Credit three hours. Prerequisite, course 1 or 2, or permission to register. Given in alternate years. Lecture, T 8. East Roberts 212. Laboratory, W 1.40–4. East Ithaca Gardens. Professor WORK.

One week of laboratory work preceding the beginning of regular instruction is required. The department should be notified of intention to register in this course. Report at East Ithaca Gardens at 9 o'clock on September 24, 1931.

This course deals with the taxonomy, origin, history, characteristics, adaptation, identification, classification, exhibition, and judging, of kinds and varieties of vegetables. Attention is given also to the characteristics, production, and handling of vegetable seeds. The leading varieties of the vegetable crops are grown each year. The value of the course depends to a great extent upon gaining an acquaintance with the plant material as its grows. For this reason, part of the laboratory work is done in the gardens prior to and during registration week. Laboratory fee, $2.

221. **Research.** Throughout the year. For graduates and advanced undergraduates. Credit for undergraduates one or more hours a term, by arrangement. Professors THOMPSON, WORK, and HARDENBURG, and Assistant Professors KNOTT and SMITH.

Special problems may be elected in any line of vegetable work. Summer residence is often necessary in connection with experimental problems.

222. **Seminary.** First and second terms. Required of graduate students taking either a major or a minor in this department. Time to be arranged. East Roberts. Members of departmental staff.

WILD-LIFE CONSERVATION AND GAME FARMING

1. **The Conservation of Wild Life.** First term. Credit two hours. Lectures, T Th 11. McGraw 5. Professors NEEDHAM, HOSMER, WIEGAND, BRISTOW ADAMS, WARREN, HERRICK, EMBODY, PALMER, A. H. WRIGHT, CLAASSEN, YOUNG, and ALLEN, and cooperating specialists.

This course is planned to give the student an introduction to the general field of natural history from the standpoint of conservation.

ZOOLOGY

8. **Elementary Taxonomy and Natural History of Vertebrates.** First and second terms. Credit three hours a term. Lecture, M 8. Laboratory, M W 1.40–4 or T Th 1.40–4. McGraw 7. Professor WRIGHT and Dr. HAMILTON.

Lectures on fishes, amphibians, reptiles, birds, and mammals, dealing with the principles of classification and nomenclature, characteristics, relationships, and bionomics of these groups. The laboratory gives practice in the identification of North American species. Field studies of the local fauna are undertaken during the fall and spring. Several all-day field trips are taken during the year. Laboratory fee, $4.

Students completing this course may arrange under course 300a to pursue advanced work in taxonomy of vertebrates.

9. **General Ornithology.** Second term. Credit three hours. Lecture, W 11. McGraw 5. Field work and laboratory, M W 1.40–4 or T Th 1.40–4. Professor ALLEN and Messrs. KELLOGG and RAND.

This course is intended primarily for students wishing to gain a knowledge of local birds, their songs, habits, relation to agriculture, and the general principles of their classification. Laboratory studies are based largely on field work. After the first of May, field trips will be taken at 5.30 a. m. Laboratory fee, $3.

22. **Ichthyology, Advanced Systematic and Field Zoology.** Throughout the year. Credit three hours a term. Lectures, T Th 8. McGraw 7. Laboratory, F 2–4.30 or S 8–10.30. Professor WRIGHT and Dr. HAMILTON.

An amplification of the prerequisite course 8. In the lectures, special emphasis is laid on the principal phases of animal life; the taxonomy, origin, and evolution of fossil and living groups; geographical distribution; and the literature and institutions of zoology. Laboratory periods are devoted to the identification of exotic and indigenous forms. Several all-day field trips are taken during the year.

[23. **Herpetology (Amphibia).** First term. Credit three hours. Professor WRIGHT and Dr. HAMILTON.] Not given in 1931–32.

[24. **Herpetology (Reptilia).** Second term. Credit three hours. See announcement for course 23. Professor WRIGHT and Dr. HAMILTON.] Not given in 1931–32.

[25. **Mammalogy.** Throughout the year. Credit three hours. Professor WRIGHT and Dr. HAMILTON.] Not given in 1931–32.

67. **Seminary in Systematic Vertebrate Zoology.** First and second terms. Credit one hour a term. Hours to be arranged. Professor WRIGHT.

Life-zone plans of North America, 1817–1920. Distribution and origin of life in North America. Zoogeography of the Old World. Animal coloration. Other topics, to be announced.

126. **Advanced Ornithology.** First term. Credit three hours. Prerequisite, course 8 or 9. Lecture, W 11. Laboratory and field work, M W 1.40–4. McGraw. Professor ALLEN and Messrs. KELLOGG and RAND.

A consideration of the birds of the world, their structure and classification. The first part of the term is devoted to field work on the fall migration and the identification of birds in winter plumage. Laboratory fee, $3.

[131. **Applied Ornithology.** First term. Credit three hours. Should be preceded by course 8 or 9, and presupposes an elementary knowledge of botany and entomology. Professor ALLEN and Messrs. KELLOGG and RAND.] Not given in 1931–32.

This course is intended primarily for students planning professional work in ornithology. Field collecting, preparation of specimens, and natural-history photography are emphasized, together with the food and feeding habits of birds; museum and Biological Survey methods. Laboratory fee, $3.

300. **Zoological Problems.** Throughout the year. Credit hours variable. Admission by consent of the instructor.

300a. **Vertebrate Taxonomy and Natural History.** Professor WRIGHT.

300b. **Ornithology.** Professor ALLEN.

EXTENSION WORK

The extension work of the College of Agriculture is designed to help persons directly on their farms, and to aid those who desire definite instruction but who cannot take a long or a regular course in agriculture at the University. The work supplements the teaching and experimenting of the College. It is professedly a popular work. It endeavors to reach the common problems of the people, to quicken the agricultural occupations, and to inspire a greater interest in country life. It is also a bureau of publicity, whereby there is an exchange of all important matters connected with the progress of the agriculture of the State.

The Office of Farm Bureaus is located on the second floor of Roberts Hall. This office represents the New York State Department of Agriculture, the College of Agriculture, and, through the Dean, the States Relations Service in the United States Department of Agriculture, in the administration and supervision of farm-bureau work in New York State. It has general charge of the organization and supervision of farm bureaus and of the cooperative relations of the institutions represented by the bureaus, and receives weekly work reports and monthly financial reports from the different counties. Its equipment consists mainly of files and records of the fifty-five farm bureaus in the State.

WINTER COURSES

The Winter Courses are six in number, opening on November 4, 1931, and closing on February 12, 1932. They are:

1. Agriculture.
2. Dairy Industry.
3. Poultry Husbandry.
4. Fruit Growing.
5. Flower Growing.
6. Vegetable Crops.

A special program describing these courses will be sent on application to Olin W. Smith, Secretary, New York State College of Agriculture, Ithaca, New York.

SUMMER SCHOOL

The Summer School is a six-weeks summer session beginning early in July. It is designed to meet the needs not so much of college students as of teachers, supervisors, superintendents, extension workers, and others professionally concerned with activities of an educational nature.

College students desiring to use the summer for additional study are in general advised to enter the Summer Session in Cornell University rather than the Summer School of Agriculture.

Summer School of Biology

Coincident with the Summer School, there is held a School of Biology for teachers and advanced workers. The work is laid out in comprehensive courses including, unabridged, what is offered in the corresponding courses in a term of the regular academic year. For advanced students there is opportunity for special work under the various members of the staff.

COURSES IN OTHER COLLEGES THAT MAY BE OFFERED TO MEET THE SPECIFIC REQUIREMENTS OF REGULAR STUDENTS IN THE COLLEGE OF AGRICULTURE

1. **English.** First and second terms. Credit three hours a term. Students who have not taken the course in the first term may enter in the second term in sections provided for them. Open only to underclassmen who have satisfied the entrance requirement in English. Sections at the following hours: M W F 8, 9, 10, 11, 12, or T Th S 8, 9, 11, 12. Rooms to be announced. Messrs. Baldwin, Muller, Harris, J. C. Adams, Wentworth, and Tenney.

A study of composition in connection with the reading of representative works in English literature.

Students who elect English 1 must apply at Roberts 292 on Monday, Tuesday, or Wednesday of registration week for assignment to sections. Registration in the course is in charge of Mr. Baldwin.

101. **Introductory Inorganic Chemistry.** First or second term. Credit three hours. Lectures: two sections, M W F 11 or T Th S 11. Baker, Main Lecture Room. Professor Browne and Assistant Professor Laubengayer.

105. **Introductory Inorganic Chemistry.** First or second term. Credit three hours. Recitation, one hour a week, to be arranged. Laboratory sections: M F 1.40–4; T Th 1.40–4; W 1.40–4; S 8–10.20. Baker 150. Professor Browne, Assistant Professor Laubengayer, and assistants.

Chemistry 101 and 105 must be taken simultaneously, unless permission is obtained by the student from the Dean of his College and from the Department of Chemistry to take either course alone.

100. **Introductory Geology.** First or second term. Credit three hours. Lectures: first term, T Th 11; second term, T Th 9. Sibley Dome. Laboratory, M T W Th or F 1.40–4, or S 8. McGraw. Students must register for laboratory assignment at geology laboratory, McGraw, before the beginning of the course. Professor Ries, Dr. Burfoot, and Messrs. Megathlin and Conant.

This course is planned to give beginners the fundamental principles of this branch of science. The inorganic aspects of the subject are emphasized more than are the organic.

200. **Elementary Physical Geography.** First and second terms. Credit three hours a term; if taken after course 201, credit two hours a term. Open to freshmen. Lectures, M W 9. McGraw, Geology Lecture Room. Laboratory, W or Th 1.40–4. Students must register for laboratory assignments at the physical-geography laboratory on registration day. Professor VON ENGELN and Mr. RAPPENECKER.

All students are required to go on one all-day excursion to Taughannock Gorge and Falls.

1. **Hygiene.** First term. Credit one hour. One lecture recitation each week, with preliminary and final examination. The use of a textbook is required.

Sections for men: M 9, 10, 11, 12; T 9, 11, 12; W 8, 9, 10, 11, 12; Th 8, 9, 11, 12; F 8, 11; S 8, 9, 10, 12. Professor SMILEY, Assistant Professors GOULD, SHOWACRE and YORK, and Dr. ROBINSON.

Sections for women: M 8; T 8, 10; W 2; Th 10, 2; F 9, 2; S 11. Assistant Professor EVANS and Dr. FETTERLY.

Students must report for registration and assignment to sections, the men at the Old Armory, the women at Sage Gymnasium.

2. **Hygiene.** Second term. Credit one hour. One lecture-recitation each week, with preliminary and final examination. The use of a textbook is required.

Sections for men: M 9, 10, 11, 12; T 9, 11, 12; W 8, 9, 11, 12; Th 9, 11, 12; F 8, 11, 12; S 8, 9, 10, 12. Professor SMILEY, Assistant Professors GOULD, SHOWACRE, and YORK, and Dr. ROBINSON.

Sections for women: M 8; T 8, 10; W 2; Th 10, 2; F 9, 2; S 11. Assistant Professor EVANS and Dr. FETTERLY.

Students must report for registration and assignment to sections, the men at the Old Armory, the women at Sage Gymnasium.

3. **Introductory Experimental Physics.** First term. Credit three hours. Two plans of study are offered, as follows:

(a) Primarily for students who do not offer physics for entrance. Demonstration lectures, W F 9 or 11. Rockefeller A. One two-hour laboratory period, to be arranged. Rockefeller 220. Assistant Professor HOWE and assistants.

(b) Open only to students who offer physics for entrance. Demonstration lecture, M 9 or 11. Recitations, W F 9 or 11, T Th 9 or 11. One two-hour laboratory period, to be arranged. Assistant Professor HOWE and assistants.

Properties of matter, sound, and light.

4. **Introductory Experimental Physics.** Second term. Credit three hours. A continuation of course 3. May be taken before course 3.

Sections (a) and (b) and hours as in course 3. Lectures: (a) Professor MERRITT, (b) Assistant Professor HOWE.

Electricity, magnetism, and heat.

10. **The Physiology of the Nutrition and Secretion of the Domesticated Animals.** First or second term. Credit three hours. Lectures: first term, M W F 9; second term, M W F 10. Veterinary College. Professor HAYDEN.

303. **Human Physiology.** First or second term. Credit three hours. M W F 10. Stimson Amphitheater. Assistant Professor DYE and instructor.

This course is designed primarily for students who are familiar with the first principles of biology and chemistry and who are in a position to understand the general physiological processes presented, and for those who desire a general knowledge of the physiological processes as applied to the human body.

1. **Modern Economic Society.** First or second term. Credit five hours. Daily except S 8, 9, 10, 11, 12. Professor ENGLISH and Assistant Professor O'LEARY.

Students should register, if possible, on the first day of registration. Section assignments will be made at Goldwin Smith 260 on registration days. In the first term the registration will be limited in number.

A survey of the existing economic order, its more salient and basic characteristics, and its operation.

1. **Solid Geometry.** First or second term. Credit three hours. First term, M W F 8, T Th S 10; second term, M W F 10, T Th S 8.

3. **Plane Trigonometry.** First or second term. Credit three hours. First term, M W F 10, T Th S 8; second term, M W F 8, T Th S 10.

1. **Introductory Zoology.** First and second terms. Credit three hours a term. Lectures: section 1, T Th 9; section 2, T Th 11. Goldwin Smith B. Laboratory, M T W or F 1.40–4, or S 8–10.30. McGraw 2. Registration with the department before instruction begins is necessary for the assignment of laboratory and lecture sections. Professor REED and Misses MEKEEL, MCMULLEN, and PHELPS.

A comprehensive view of the subject of animal biology including the principles of structural and functional organization in the body, the animal as a living organism, and the origin and perfection of types, together with a consideration of zoological theory.

UNIVERSITY REQUIREMENTS IN MILITARY SCIENCE AND TACTICS, AND PHYSICAL TRAINING

All undergraduates must submit to a physical examination each year in the University Medical Adviser's office. Appointment for this examination must be made during the regular registration days by all new students and sophomores in the first term, and by all juniors and seniors in the second term.

MILITARY SCIENCE AND TACTICS

1. **Practical and Theoretical Training.** Throughout the year. Every able-bodied male student (unless an alien), a candidate for a baccalaureate degree, who is required to take five, six, seven, eight, or more terms in residence (or the equivalent in scholastic hours), must take, in addition to the scholastic requirements for the degree, one, two, three, or four terms, respectively, in the Department of Military Science and Tactics. Three hours a week, M T W or Th 1.40–4.10 p. m. New York State Drill Hall.

The requirements in Military Science and Tactics must be completed in the first terms of residence; otherwise the student will not be permitted to register again in the University without the consent of the University Faculty.

The course of training is that prescribed by the War Department as basic for Infantry and Field Artillery, branches of the Reserve Officers' Training Corps. The Infantry includes instruction in military courtesy, command and leadership, physical training, ceremonies, rifle marksmanship, automatic rifle, musketry, scouting and patrolling, grenades, machine guns, the fundamental principles of minor tactics and leadership, and the National Defense Act. The Field Artillery includes instruction in organization of the battery, customs of the service, military courtesy and discipline, dismounted drill, drill of the gun squad including service of the piece, gunner's examination, hippology, equitation and horsemanship, physical training, and topography.

PHYSICAL TRAINING

1. **Physical Training for Men Excused from Drill (Freshmen).** Throughout the year, three periods a week. Class and squad work and prescribed exercises. Mr. O'CONNELL and assistants.

2. **Physical Training for Men Excused from Drill (Sophomores).** Throughout the year, three periods a week. Class and squad work and prescribed exercises. Mr. O'CONNELL and assistants.

3. **Physical Training for Men (Juniors and Seniors).** Building-up and corrective exercises as prescribed by the medical examiners as a result of the physical examination required of all students in the University. Mr. CHAMBERLAIN.

6. **Physical Training for Women (Freshmen).** Throughout the year, three periods a week. Misses BATEMAN, CANFIELD, READ, DANIELS, and WATERMAN.

7. **Physical Training for Women (Sophomores).** Throughout the year, three periods a week. Misses BATEMAN, CANFIELD, READ, DANIELS, and WATERMAN.

The work of the two years consists of outdoor sports from the beginning of the year to Thanksgiving, and from the Easter vacation to the end of the year. From Thanksgiving to Easter, the work is indoors, and consists of gymnastic exercises, folk, aesthetic, and interpretative dancing, indoor games, and apparatus work.

For further information as to the required work in physical training, see the handbook issued by the department.

ELECTIVE COURSES IN MILITARY SCIENCE AND TACTICS, AND HYGIENE AND PREVENTIVE MEDICINE

A description of all other courses available for election by students in the College of Agriculture may be found in the announcements of the other colleges of the University.

Military Science and Tactics

2. **Elective Military Training.** Throughout the year. Credit two hours a term. Hours by assignment. New York State Drill Hall.

This is the advanced course prescribed by the War Department for units of the Reserve Officers' Training Corps, and includes five hours each week of both theoretical and practical instruction. Prerequisite, course 1.

Course 2 may be elected only by permission of the Dean of the College and the Professor of Military Science and Tactics. Credit will be counted in the twenty elective hours allowed outside the College of Agriculture (page 27). To enjoy the benefits offered by the Federal Government, the student must agree to continue the course for four terms and to attend a summer camp having a duration of about six weeks. Upon the completion of this course the student is eligible for a commission as Second Lieutenant in the Officers' Reserve Corps.

Hygiene and Preventive Medicine

All undergraduates must submit to a physical examination each year in the University Medical Adviser's office. Appointment for this examination must be made during the regular registration days by all new students and sophomores in the first term and by all juniors and seniors in the second term.

All freshmen are required to include Hygiene 1 and 2 in their schedules.

The following courses may be elected for credit. Prerequisite for these courses, Hygiene 1 and 2. Registration at Hygiene office, Old Armory.

3. **Hygiene: Health Supervision of School Children.** Second term. Credit two hours. Open to sophomores, juniors, and seniors. Prerequisites, suggested but not demanded, Human Physiology and Anatomy. T Th 12. Histology Lecture Room, Stimson. Assistant Professor Gould.

A practical course of lectures and demonstrations designed to familiarize the student with the facts and methods necessary for making an effective health supervision of school children.

4. **Hygiene: Advanced First Aid.** First term. Repeated in second term. Credit one hour. Prerequisite, Human Anatomy or Human Physiology. Enrollment limited and registration only after conference with instructor in charge. First term: section 1, T 12, section 2, F 9, Anatomy Lecture Room, Stimson. Second term: section 1, M 8, Histology Lecture Room, Stimson; section 2, S 9, Anatomy Lecture Room, Stimson. Assistant Professor Showacre.

This course includes the theory of the diagnosis and temporary treatment of the common emergencies with practical application of the essential fundamentals.

5. **Hygiene: Industrial Hygiene.** First term. Credit one hour. Th 12. Histology Lecture Room, Stimson. Assistant Professor Gould.

Factory sanitation, ventilation, and illumination; occupational poisoning and disease; factory legislation; accident prevention; fatigue in industry; preventive medicine in the industries.

7. **Hygiene: Rural Hygiene.** Second term. Credit one hour. W 12. Anatomy Lecture Room, Stimson. Professor Smiley.

A general consideration of the health problems peculiar to rural areas with the presentation of practical schemes for the solution of these problems as far as possible.

8. **Hygiene: Mental Hygiene.** First and second terms. Credit two hours. T Th 2. Histology Lecture Room, Stimson. Assistant Professor York.

A study of the factors involved in the maintenance of mental health of the individual; that is, satisfactory human relationships, attitudes, and behavior. Discussion of the causes and mechanisms underlying the more common personality deviations.

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